Pearson Patches
Environmental Assessment

Clearwater Unit
Southwest Land Office
Montana Department of Natural Resources and Conservation

September 2019

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Environmental Assessment

Project Name: Pearson Patches
Proposed Implementation Start Date: Fall 2019
Proponent: Clearwater Unit, Southwest Land Office, Montana DNRC
County: Powell

Type and Purpose of Action

Description of Proposed Action:

The Clearwater Unit of the Montana Department of Natural Resources and Conservation (DNRC) is proposing management activities on up to 3,000 acres in the East Chamberlain / Pearson Creek / Lobe Creek area located roughly five miles southeast of Ovando, MT. The project area is in the vicinity of Chamberlain Creek, south of Highway 200. Refer to vicinity map Attachment A-1 and project maps**.** The proposed treatments would include commercial timber harvests on approximately 1,500 acres removing an estimated 3-4 million board feet (MMBF) and pre-commercial thinning on approximately 1,300 acres. Prescribed burning (piles or broadcast), tree planting, and weed treatments (chemical, mechanical, or biological) may also occur within the project area. Road maintenance and improvements will be needed on existing roads, as well as some new road construction where existing roads are inadequate (a road running parallel and directly next to a stream, for example). In some cases, existing road would be abandoned. This project includes the following sections:

Beneficiary	Legal Description	Total Acres	Treated Acres
Common Schools	Sections 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, and 17 T14N R13W and Sections 7, 17, 18, 19, and 20 T14N R12W	**7,800**	**2,700**
Public Buildings			
MSU 2nd Grant			
MSU Morrill			
Eastern College-MSU/Western College-U of M			
Montana Tech			
University of Montana			
School for the Deaf and Blind			
Pine Hills School			
Veterans Home			
Public Land Trust			
Acquired Land			

Action	Quantity
Proposed Harvest Activities	
Shelterwood	0 acres
Seedtree	460 acres
Individual Selection	600 acres
Overstory Removal	160 acres
Old Growth Maintenance	0 acres
Commercial Thinning	230 acres
Total Harvest Acres	**1,450 acres**
Proposed Forest Improvement Treatment	
Pre-commercial Thinning	**1,250 acres**
Planting	*As needed*
Prescribed burning/pile burning	*As needed*
Proposed Road Activities	
New permanent road construction (Restricted Class A)	.6 miles
Road maintenance	31 miles
Road abandoned	2 miles

Please note that these are estimates of the acreage of treatment units (harvest and forest improvement) and mileage of roads.

Objectives of these projects include:

- Maximize revenue over the long-term for trust accounts from the timber resources and provide a sufficient amount of sawlog volume to contribute to the DNRC's sustained yield as mandated by State Statute *77-5-222, MCA*.
- Manage the identified parcels intensively for healthy and biologically diverse forests to provide long-term income for the Trusts.
- Bring stands closer to historic conditions.
- Improve access and BMP compliance with new construction and road maintenance activities.
- Improve stand growth and vigor and reduce the threat of future losses to fire, insects, and disease.
- Decrease visual impacts to the aesthetics of the area when viewed from areas around this sale.

The lands involved in this proposed project are held in trust by the State of Montana. (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and the DNRC are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for the beneficiary institutions (*Section 77-1-202, MCA*).

The DNRC would manage lands involved in this project in accordance with:

- The State Forest Land Management Plan (DNRC 1996)
- Administrative Rules for Forest Management (ARM 36.11.401 through 471)
- The Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP) (DNRC 2010)
- The North Chamberlain Conservation Easement (DNRC 2010)
- Other applicable state and federal laws

Project Development

SCOPING:

- DATE: **February 2018**
  - ***See ATTACHMENT B***
- PUBLIC SCOPED:
  - The scoping notice was posted on the DNRC Website:
  - http://dnrc.mt.gov/public-interest/public-notices
  - It was mailed to those listed in ***ATTACHMENT B***
- AGENCIES SCOPED:
  - Montana Department of Fish, Wildlife, and Parks (FWP)
  - United States Forest Service, Seeley Lake Ranger District
  - Bureau of Land Management, Missoula Field Office
  - Tribes, ***See ATTACHMENT B***
- COMMENTS RECEIVED:
  - How Many: 4 from Montana Department of Fish, Wildlife, and Parks (DFWP) Confederated Salish and Kootenai Tribes, The Northern Cheyenne Tribe and Weyerhauser,
  - Concerns: Comments focused on notification of the is cultural artifacts are discovered during project implementation, adherence to the conservation easement requirements on the property and general support of active forest management.
  - ***See ATTACHMENT B*; very few comments were received and are addressed in each section of this document where they apply.**

Internal and external issues and concerns were incorporated into project planning and design and would be implemented in associated contracts.

INTERDISCIPLINARY TEAM (ID):

- Project Leader: Cindy Super
- Archeologist: Patrick Rennie
- Wildlife Biologist: Garrett Schairer
- Fisheries Biologist: Mike Anderson
- Hydrologist & Soil Scientist: Andrea Stanley

OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED: (Conservation Easements, Army Corps of Engineers, road use permits, etc.)

United States Fish & Wildlife Service (USFWS) - DNRC is managing the habitats of threatened and endangered species on this project by implementing the Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP) and the associated Incidental Take Permit that was issued by the USFWS in February of 2012 under Section 10 of the Endangered Species Act. The HCP identifies specific conservation strategies for managing the habitats of grizzly bear, Canada lynx, bull trout, westslope cutthroat trout, and Columbia redband trout. This project complies with the HCP. The HCP can be found at www.dnrc.mt.gov/HCP.

Montana Department of Environmental Quality (DEQ) - DNRC is classified as a major open burner by DEQ and is issued a permit from DEQ to conduct burning activities on state lands managed by DNRC. As a major open-burning permit holder, DNRC agrees to comply with the limitations and conditions of the permit.

Montana/Idaho Airshed Group - DNRC is a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (Montana/Idaho Airshed Group 2006). As a member of the Airshed Group, DNRC agrees to burn only on days approved for good smoke dispersion as determined by the Smoke Management Unit.

Montana Department of Fish, Wildlife and Parks (FWP) - A conservation easement is in place for portions of the project area. Conservation easement land steward Kevin League was consulted to ensure compliance with the easement; FWP biologist Scott Eggeman was also consulted during pre-harvest planning. A management plan for North Chamberlain was developed in 2010 and DNRC will follow all commitments outlined in the management plan. A Stream Protection Act Permit (124 Permit) is required from FWP for activities that may affect the natural shape and form of a stream's channel, banks, or tributaries. Culvert replacements would implement erosion control and stream protection and meet the requirements of the FWP 124 permit issued for this project.

ALTERNATIVES CONSIDERED:

NO-ACTION:

- The proposed harvest, road maintenance, and forest improvement work would not occur. No BMP improvements will be made and potential damage to aquatic habitat will continue.
- No money would be received by School Trust from activities of this project.
- Stands would remain at overstocked levels and are currently under possible insect and disease threats including mountain pine beetle (*Dendroctonus ponderosae*) spruce budworm (*Choristoneura occidentalis*), Douglas-fir beetle (*Dendroctonus pseudotsugae*), and Armillaria root disease (*Armillaria ostoyae*).
- Road systems would not be changed; locations would not be improved and current use (including unregulated use on DNRC land) would continue.
- Concerns regarding overstocked stands and associated fire danger would continue.
- Douglas-fir would continue to overcrowd the western larch and ponderosa pine (desired species for the site); the stands would not be directed toward desired future condition.
- All pre-commercial stands would continue to grow with decreased vigor and would show more death within the stand.

ACTION ALTERNATIVE:

- This proposal includes timber harvest under several timber permits and timber sales on approximately 3,000 acres removing an estimated 3-4 million board feet (MMBF). The first timber sale is planned to occur in FY 2020.
- Stands would have stocking levels reduced and could show a decrease in losses due to insects and disease.
- Road systems would be changed to improve locations and reduce unregulated use on DNRC land while still allowing for regulated recreational use.
- The risk of fire growth would be lessened across DNRC lands.
- Pre-commercial thinning would also occur under this EA with a plan to increase vigor and reduce overstocking and mortality.
- Weed spraying and grass seeding would occur occasionally and following harvest to mitigate the spread of noxious weeds.
- Money would be received by the Common School Trust.
- These stands would be directed toward Desired Future Condition.

Impacts on the Physical Environment

VEGETATION:

Issues and Concerns - The following issue statements were developed during planning and scoping regarding the effects of the proposed action to vegetation:

- Shade tolerant species would continue to out-compete seral species, removing stands from their historic cover type and species distribution.
- Young stands are currently overstocked.
- The increase of Douglas-fir in the understory has perpetuated spruce bud worm, slowing growth of the understory and increasing the risk of catastrophic wildfire on DNRC land.
- Forest management activities may result in introduction of new weeds or increased spread of noxious weeds.
- The proposed project could negatively impact populations of threatened, endangered, or sensitive plant species.
- The proposed project could negatively impact the habitats of threatened, endangered, or sensitive animal species, specifically grizzly bear and Canada Lynx.

Recommended Mitigation Measures for Vegetation - The analysis and levels of effects to vegetation resources are based on implementation of the following mitigation measures.

- Favor western larch and ponderosa pine in harvest areas and pre-commercial thinning to shift species represented toward the Desired Future Condition, also minimizing Douglas-fir and reducing concentrations of spruce bud worm.
- Plant western larch and ponderosa pine in planting blocks to shift species represented toward the accepted Desired Future Condition.
- Conduct Old Growth recruitment treatments to recruit Old Growth on the landscape.
- Prescribe a selection harvest to emulate natural disturbance historically present on the landscape.
- Wash equipment prior to harvest to limit weed seed dispersal.
- Spray weeds along roadsides and landings to limit spread of existing weeds, while preventing weed spraying within sensitive desirable plant populations.
- Plant grass on newly disturbed road surfaces and burn piles to limit the resources available for weeds to become established.
- Burn slash in certain areas to allow for grass, shrubs, and trees to grow and improve mobility for weed spraying off roads.

Recommended Mitigations and Adjustments of Treatments for the Benefit of Other Resources

- Snags, snag recruits, and coarse woody debris would be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.
- Best Management Practices (BMPs) will be followed, to include those recommended for Class 1 fishery streams and Class 2 streams. BMPs relating to wetlands will be followed as well.
- Operating period for commercial timber harvest will be specified to prevent disturbance during critical wildlife activities (denning, nesting, etc).

FOR COMPLETE VEGETATION ANALYSIS SEE *ATTACHMENT C*.

SOILS:

Issues and Concerns- The following issue statements were developed during planning and scoping regarding the effects of the proposed action to soils:

Soil resources may be adversely affected by implementation of the project. Issues include the following:

- slope stability
- erosion
- physical disturbance (compaction and displacement)
- nutrient cycling and soil productivity

Recommended Mitigation Measures for Soils-

Below is a list of additional mitigations that would be included in any implementation of the Action Alternative in order to reduce the potential impacts of the project on soil resources. These mitigations are assumed in this soils resource analysis. Some mitigations are project-specific, and others are general common practice or are commitments made by the DNRC such as the State Plan and the HCP. Additionally, the Forest Officer would continue to meet the management standards identified in the North Chamberlain Conservation Easement (CE).

- To prevent soil compaction ground-based mechanical felling and yarding would be restricted to one or more of the following conditions:
    - Soil moisture content at 4-inch depth less than 20% oven-dry weight.
    - Minimum frost depth of 4 inches.
    - Minimum snow depth of 18 inches of loose snow or 12 inches packed snow.
- For each individual sale the logger and the Forest Officer would agree to a general hauling, landing, and skidding plan prior to equipment operations to meet the following objectives:
    - Limit trails to existing skid trail disturbances as much as possible to minimize new disturbances.
    - Do not use existing skid trails and landings that are within an RMZ.
    - Limit ground-based equipment operations on slopes greater than 45%, except for short pitches.
- Slash would be distributed as much as possible within harvest units. This includes large (≥3-inch diameter) and fine material (such as branches and leafy material).

  The amount of course woody material appropriate to the dominant habitat type within the project area (DF/PHMA) is **4.5 to 9 tons per acre** (Graham et al., 1994). Much of the forest within the harvest units is second or third growth following harvesting over the past century. This has likely resulted in some deficit to the natural nutrient cycling return and in wood debris in the large size class. The project should include a maximization of practicable retention of material within the harvest units within the 4.5 to 9 tons per acre. This can be achieved by any or a combination of the methods listed below:
    - Minimization of the removal of fine branches and leafy material.
    - Cut-to-length harvest systems (when used) leaving large and fine debris distributed within harvest units.
    - Return slash to harvest units simultaneously with skidder returns from log landings.
    - Removal of tree tops and branches within harvest units prior to whole tree skidding.
- Skid trails and landings would be treated with slash, water bars, and grass seed to reduce the risk of the concentration and impede overland flow and consequent erosion, to reduce soil detachment by raindrop impact, discourage the recruitment and establishment of weeds on disturbed soils.
- Scarification would be limited to the following conditions:
    - Slopes less than 40%

- Cumulative area of direct disturbance, when combined with ground-based yarding disturbances, would not exceed 40%.
- Where there is an identified need for mineral soil exposure for germination of desired species (such as western larch).
- Scarification depths not to exceed those necessary to achieve exposure of mineral soil.

FOR COMPLETE SOILS ANALYSIS SEE *ATTACHMENT D.*

WATER RESOURCES:

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to water resources:

Timber harvest, site preparation, road construction/maintenance, and vegetation management can alter local water quality and quantity. Water resource issues include the following:

- Quality
- Quantity

Recommended Mitigation Measures for Water Resources- The analysis and levels of effects to water resources are based on implementation of the following mitigation measures.

Below is a list of additional mitigations that would be included in any implementation of the Action Alternative in order to reduce the potential impacts of the project on water resources.

- Drainage improvement and maintenance work would be completed on existing roads within state lands and on the haul route between the project area and the nearest county road. The Project Leader would complete a road log for location and design of drainage improvements on existing roads and for the installation of the proposed new roads.

FOR COMPLETE WATER RESOURCES ANALYSIS SEE *ATTACHMENT E*.

FISHERIES RESOURCES *(including unique, federally listed as threatened or endangered, sensitive, and/or species of special concern):*

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to fisheries resources:

- **Fisheries Connectivity: -** Restrictions to fisheries connectivity were identified in Pearson Creek, and East Fork Chamberlain Creek with four existing crossing structures preventing upstream movement by all life stages of westslope cutthroat trout.

Recommended Mitigation Measures for Fisheries Resources- The analysis and levels of effects to fisheries resources are based on implementation of the following mitigation measures.

- DNRC would implement all applicable BMP's, Montana Administrative Rules for Forest Management, DNRC HCP measures and reasonable mitigation and erosion control practices during timber harvest, road maintenance, road construction and road use activities to reduce sedimentation and minimize effects to fisheries.
- DNRC would locate, clearly mark and maintain suitable water resource protection boundaries including SMZ's, RMZ's, and WMZ's adjacent to streams and wetlands as consistent with State Forest Land Management Plan (SFLMP) rules and the North Chamberlain conservation easement.
- Existing road segments would be improved and maintained in association with the harvest activities. Road improvements would include surface blading, installation of drainage features to prevent surface erosion and

sediment delivery to the stream, ditching to improve road surface stability and gravel surfacing of selected segments as needed to comply with BMP's and protect water quality.

- Road use would be limited to dry or frozen ground conditions to reduce rutting, potential erosion and sedimentation. New road construction, including drainage features, would be completed in the fall prior to freeze-up. Check snow/frozen ground conditions prior to operations.
- New roads would be closed to motor vehicles upon completion of harvest activities. Slash would be placed on main skid trails to protect soils and reduce erosion potential and unauthorized ATV use where appropriate.
- Culvert replacements would implement erosion control and stream protection and meet the requirements of the DFWP 124 permit issued for this project.
- Remove or replace existing road-stream crossings that currently limit fisheries connectivity.

FOR COMPLETE FISHERIES RESOURCE ANALYSIS SEE *ATTACHMENT F*.

WILDLIFE (terrestrial & avian including unique, federally listed as threatened or endangered, sensitive, and/or species of special concern):

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to wildlife:

- Proposed activities could alter mature forested habitats and/or landscape connectivity, which could affect species that rely on these mature forested habitats, and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.
- Proposed activities could alter cover, reduce secure areas, and increase access, which could affect grizzly bears by displacing them from important habitats and/or increasing risk to bears of human-caused mortality.
- Proposed activities could negatively affect Canada lynx by altering lynx winter foraging habitat, summer foraging habitat, and other suitable habitat, rendering these habitats unsuitable for supporting lynx.
- Proposed activities could negatively affect bald eagles by reducing nesting and perching structures and/or disturbing nesting bald eagles.
- Proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.
- Proposed activities may alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, while potentially removing snags needed by flammulated owls for nesting.
- Proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.
- Proposed activities could reduce suitable nesting and foraging habitat for pileated woodpeckers, which could alter pileated woodpecker use of the area.
- Proposed activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range.
- Proposed activities could remove big game security cover, which could affect hunter opportunity and local quality of recreational hunting.

Recommended Mitigation Measures for Wildlife- The analysis and levels of effects to wildlife are based on implementation of the following mitigation measures.

- A DNRC biologist would be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435) are needed.
- If a wolf den is found within 1 mile of active harvest units or within 0.5 miles of a rendezvous site, cease operations and consult a DNRC wildlife biologist for appropriate site-specific mitigations before resuming activities.

- Motorized public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs would be used during active periods and a physical closure (gate, barriers, equipment, etc.) would be used during inactive periods (nights, weekends, etc.). These roads and skid trails would be reclosed to reduce the potential for unauthorized motor vehicle use.
- Snags, snag recruits, and coarse woody debris would be managed according to ARM 36.11.411 through 36.11.414, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.
- Contractors and purchasers conducting contract operations would be prohibited from carrying firearms while on duty.
- Food, garbage, attractants, and other unnatural bear foods would be stored in a bear-resistant manner.
- Harvesting and thinning would be prohibited between April 1 and June 15 to minimize the potential for disturbance to grizzly bears, bald eagles, and a host of other species.
- Retention of patches of advanced regeneration of shade-tolerant trees, such as sub-alpine-fir, in units in lynx habitats would break-up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx.
- Provide connectivity for fisher, Canada lynx, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridge tops, and saddles.
- DNRC would locate, clearly mark and maintain suitable water resource protection boundaries including SMZ's, RMZ's, and WMZ's adjacent to streams and wetlands as consistent with State Forest Land Management Plan rules and the North Chamberlain conservation easement.

FOR COMPLETE WILDLIFE ANALYSIS SEE *ATTACHMENT G*.

AESTHETICS

Any change to the scenery in the area from these alternatives would be in addition to past activity within the project area. This analysis includes all past and present effects.

Issues and Concerns- No issues were developed during scoping regarding the effects of the proposed action to aesthetics.

Existing Conditions

The landscapes in the greater area are influenced by glaciation with steep glaciated peaks and lower rolling ridges or have been carved and formed by various streams and the Blackfoot River. The landscape within the project area is mountainous with deep canyons formed by the streams that still occupy the bottom areas or have remains of tarns, generally along the tops of ridges or benches within the area. Several streams are in the area including Chamberlain Creek, East Fork Chamberlain Creek, Pearson Creek, and Lobe Creek to name a few. Benches created by the glaciers and/or the streams, are moderately to heavily timbered. State Highway 200 is nearby and much of the proposed area is clearly visible from this highway on most days. Any changes within the area from these alternatives would be in addition to past harvests, road building, and other uses within the area.

Recommended Mitigation Measures for Aesthetics- The analysis and levels of effects to aesthetics are based on implementation of the following mitigation measures.

- Use topography, openings, and other changes on the ground to make harvest and pre-commercial thinning units less visibly obtrusive.
- Varying densities and using "clumpy" spacing reduces the changes to the scenic integrity of the site.

No Action Alternative:

Direct, Indirect, and Cumulative Effects

The risk of direct effects would be low. Over time, tree growth would be expected to fill in current, naturally occurring openings. The risk of indirect effects would be expected to be insignificant.

Past forest management activity on surrounding lands would contribute to the cumulative visual effects to project area landscape. The risk of cumulative effects would be low as disturbances from past forest management activities have mostly revegetated. A minimal amount of cumulative effects would be expected from the continued increase in vegetative growth due to the long period of time involved.

Action Alternative:

Direct, Indirect, and Cumulative Effects

The timber harvest would be visible from Highways 200. However, harvest would appear as an extension of other cutting units from the past. Some of the areas of harvest would be blocked from long distance viewing due to topographic changes or potentially flatter land that would be harvested. An experienced observer or someone who resides in the area would notice the changes to the other stands, mostly this would occur due to the decrease in stand density.

Where possible, much of the proposed cutting would be light to moderate in intensity, especially from a distant observation spot. As many of the largest trees would be left, and a random, natural spacing would be used, it would be easier to decrease contrast in form, line, color, and texture between treated and untreated stands. Silvicultural treatments would borrow extensively from the natural grassy openings and only slightly affect the texture of the seen areas.

Harvest units on heavily wooded hillsides would be more noticeable. As hillsides become steeper, it becomes easier to notice changes in the vegetation. The plan for these harvest units is to work with topographical features, the minimal openings on the hillside, and to make unit boundaries that aren't constant straight lines. This would show moderate visual impacts in the short-term. Most areas would likely see low to moderate impacts to the aesthetics.

Any change to the scenery in the area from these alternatives would be in addition to past timber harvests, road building, vegetation management (grazing, pre-commercial thinning, etc.) and fire activity within the project area. This analysis includes all past and present effects. Generally, slash disappears from the site within five years, and is often covered by other vegetation within three years. Due to slash and the initial color contrasts of the slash and limited road improvement work, there would be an expected short-term impact. Cumulative effects would be expected to be low given the revegetation of the older harvests nearby, and the time period of the proposed actions.

NOISE

Any change to the noise levels in the area from these alternatives would be in addition to past activity within the project area. This analysis includes all past and present effects.

Issues and Concerns- No issues were developed during scoping regarding the effects of the proposed action to noise levels.

Existing Conditions

Noise levels vary on the landscape and result from industrial and recreational uses in the area.

No Action Alternative:

Direct, Indirect, and Cumulative Effects

Noise would not be produced by the proposed project. Other activities within the area (Highway 200, activity in the area) produce noise currently. All direct, indirect, and cumulative effects of noise would be low.

Action Alternative:

Direct, Indirect, and Cumulative Effects

Harvest activities are typically quite audible, and, depending upon air conditions, equipment can be heard many miles from their location. Noise is generated by harvest operations, harvest related traffic, road construction, and administrative oversight. This could be present for the entire season of harvest, typically from mid-June through mid-March, over the three to four-year duration of the harvest, during the general "work week". Harvest operations are typically not conducted April 1 – June 15.

Based on the anticipated operating periods direct, indirect, and cumulative effects of noise are expected to be low.

HISTORICAL AND ARCHEOLOGICAL SITES:

Issues and Concerns- No issue statements were developed during scoping regarding the effects of the proposed action to archeological sites.

Existing Conditions

A Class I (literature review) level review was conducted by the DNRC staff archaeologist for the area of potential effect (APE). This entailed inspection of project maps, DNRC's sites/site leads database, land use records, General Land Office Survey Plats, and control cards. The Class I search revealed that no cultural or paleontological resources have been identified in the APE. Because the area of potential effect on state land was largely logged at various times in the past, because the Holocene age soils in the APE are relatively thin, and because the local geology is not likely to produce caves, rock shelters, or sources of tool stone, no additional archaeological investigative work will be conducted in response to this proposed development. However, if previously unknown cultural or paleontological materials are identified during project related activities, all work will cease until a professional assessment of such resources can be made.

The tribes were scoped but none identified a specific cultural resource concern.

No Action Alternative:

Direct, Indirect, and Cumulative Effects

No impacts are expected, and low direct, indirect, or cumulative effects are expected on these sites.

Action Alternative:

Direct, Indirect, and Cumulative Effects

Under the proposed action alternative, if any historical or archaeological sites are discovered during the project they would be protected and a DNRC archaeologist would be notified immediately.

Therefore, the proposed action alternative would not be expected to have any direct, indirect, or cumulative effect on historical or archaeological resources.

DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR, AND ENERGY:

There would be no measurable direct, indirect, and cumulative impacts related to environmental resources of land, water, air, and energy due to the relatively small size of the timber sale project.

OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

- State Forest Land Management Plan, DNRC 1996, sets the strategy that guides DNRC management decisions statewide.
- North Chamberlain Conservation Easement and associated management plan, July 2010.
- USFWS and DNRC 2010. Montana Department of Natural Resources and Conservation 'Forested Trust Lands Habitat Conservation Plan, Final Environmental Impact Statement, Volumes I and II (HCP). U.S. Department of

Interior, Fish and Wildlife Service, Region 6, Denver, Colorado, and Montana Department of Natural Resources and Conservation, Missoula, MT. September 2010.

Impacts on the Human Population

HUMAN HEALTH AND SAFETY:

AIR QUALITY

The DNRC is a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (Montana/Idaho Airshed Group 2006). The Group determines the delineation of airsheds and impact zones throughout Idaho and Montana. Airsheds describe those geographical areas that have similar atmospheric conditions, while impact zones describe any area in Montana or Idaho that the Group deems smoke sensitive and/or having an existing air quality problem (Montana/Idaho Airshed Group 2006).

The project area is located within Montana Airshed 3B, which encompasses portions of Missoula County and Powell County and includes the Seeley Lake and Missoula impact zones. The project area is does not lie within either impact zone.

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to air quality:

- Smoke produced during pile burning.
- Dust produced during harvesting and hauling activities.

Recommended Mitigation Measures for Air Quality- The analysis and levels of effects to air quality are based on implementation of the following mitigation measures:

- Only burn on days approved by the Montana/Idaho Airshed group, Powell County, and DEQ.
- Conduct test burn to verify good dispersal.
- Dust abatement may be used as necessary.

Slash Burning:

No Action Alternative:

Direct, Indirect, and Cumulative Effects

No slash would be burned within the project area. Other burning by other individuals may occur within the airshed. Thus, there would be no effects to air quality within the local vicinity and throughout Airshed 3B from project-related activities but there may be minimal impacts from other uses.

Action Alternative:

Direct and Indirect Effects

Slash consisting of tree limbs and tops and other vegetative debris would be piled throughout the project area during harvesting. Slash would ultimately be burned after harvesting operations have been completed. Burning would introduce particulate matter into the local airshed, temporarily affecting local air quality. Over 70% of emissions emitted from prescribed burning are less than 2.5 microns (National Ambient Air Quality PM 2.5). High, short-term levels of PM

2.5 may be hazardous. Within the typical column of biomass burning, the chemical toxics are: Formaldehyde, Acrolein, Acetaldehyde, 1, 4 Butadiene, and Polycyclic Organic Matter.

Burning within the project area would be short in duration and would be conducted when conditions favor good to excellent ventilation and smoke dispersion as determined by the Montana Department of Environmental Quality and the Montana/Idaho Airshed Group. The DNRC, as a member of the Montana/Idaho Airshed Group, would burn only on approved days. Thus, direct and indirect effects to air quality due to slash burning associated with the proposed action would be minimal.

Cumulative Effects
Cumulative effects to air quality would not exceed the levels defined by State of Montana Cooperative Smoke Management Plan (1988) and managed by the Montana/Idaho Airshed Group. Prescribed burning by other nearby airshed cooperators (for example the U.S. Forest Service) would have potential to affect air quality. All cooperators currently operate under the same Airshed Group guidelines. The State, as a member, would burn only on approved days. This should decrease the likelihood of additive cumulative effects. Thus, cumulative effects to air quality due to slash burning associated with the proposed action would also be expected to be minimal.

Dust:

No Action Alternative:
Direct, Indirect, and Cumulative Effects
No dust related to harvesting operations would be generated within the project area. Other dust-generating activities such as recreation may occur. Thus, there is not expected to be dust-related effects to air quality within the local vicinity and throughout Airshed 3B from project-related activities. However, there may be minimal impacts from other uses.

Action Alternative:
Direct, Indirect, and Cumulative Effects
Harvesting operations would be short in duration. Dust may be created from log hauling on portions of native surface roads during summer and fall months.

Direct, indirect, and cumulative effects to air quality due to harvesting and hauling associated with the proposed action would be minimal.

LOG HAULING TRAFFIC

Issues and Concerns- No issues were developed during scoping regarding the effects of the proposed action to log hauling traffic.

Existing Conditions
Log hauling traffic is common in the project area.

Recommended Mitigation Measures for Log Hauling Traffic- The analysis and levels of effects of log hauling traffic is based on implementation of the following mitigation measures:

- Log hauling would take place typically during the general “work week”.
- Signs would be posted making the public aware of log hauling traffic in the area.

No Action Alternative:
Direct, Indirect, and Cumulative Effects
No increase in log truck traffic would occur. Other log truck traffic would still be present due to the project area’s proximity to Highway 200. Thus, there may be minimal impacts to traffic from other users.

Action Alternative:

Direct, Indirect, and Cumulative Effects

Log truck traffic in the area would increase for the duration of the timber sale. However, signs would be posted indicating that log truck traffic is present in the area.

Based on the mitigation measures direct, indirect, and cumulative effects of log hauling on human health and safety would be low.

RECREATION

(including access to and quality of recreational and wilderness activities):

Issues and Concerns- No issues were developed during scoping regarding the effects of the proposed action to recreation.

Existing Conditions

The area is used for fishing, hiking, hunting, cross-country skiing, horseback riding, snowmobiling, and general recreating. Currently, a majority of the roads through the area are closed to motorized use and used only for administrative purposes.

No Action Alternative:

Direct, Indirect, and Cumulative Effects

There would be no change in road closure status and no change in the ability of people to recreate on this parcel.

There would be no change from existing conditions. Therefore, there would be no measurable direct, indirect, or cumulative impacts on recreation from this proposed action.

Action Alternative:

Direct, Indirect, and Cumulative Effects

Some roads would be reclaimed and new roads built to meet BMPs (taking a road out of a creek bottom, for instance). Some roads could be changed from open to Restricted Class A (restricting public motorized access, especially seasonally); a minor impact to snowmobile traffic may be necessary along portions of the Chamberlain Creek or East Fork Chamberlain Creek roads if hauling occurs during the winter. Log hauling may not preclude snowmobile use, road must be shared with logging related traffic. This may result in an increase in other recreational road use along this road.

Based on the mitigation measures direct, indirect, and cumulative effects of the action alternative on recreation would be low.

Will the No-Action or Action Alternatives result in potential impacts to:	Impact												Can Impact Be Mitigated ?	Comment Number
	Direct				Indirect				Cumulative					
	No	Low	Mod	High	No	Low	Mod	High	No	Low	Mod	High		
No-Action														
Health and Human Safety	**X**				**X**				**X**					
Industrial, Commercial, and Agricultural Activities and Production	**X**				**X**				**X**					
Quantity and Distribution of Employment	**X**				**X**				**X**					
Local Tax Base and Tax Revenues	**X**				**X**				**X**					

Will the No-Action or Action Alternatives result in potential impacts to:	Impact												Can Impact Be Mitigated ?	Comment Number
	Direct				Indirect				Cumulative					
	No	Low	Mod	High	No	Low	Mod	High	No	Low	Mod	High		
Demand for Government Services	X				X				X					
Density and Distribution of Population and Housing	X				X				X					
Social Structures and Mores	X				X				X					
Cultural Uniqueness and Diversity	X				X				X					
Action														
Health and Human Safety		X				X				X			***YES***	**1**
Industrial, Commercial, and Agricultural Activities and Production	X				X				X					
Quantity and Distribution of Employment		X				X				X			***YES***	**2**
Local Tax Base and Tax Revenues	X				X				X					
Demand for Government Services	X				X				X					
Density and Distribution of Population and Housing	X				X				X					
Social Structures and Mores	X				X				X					
Cultural Uniqueness and Diversity	X				X				X					

Comment Number 1: Health and Human Safety

Impact
Smoke would be produced during pile burning. Dust would be produced during hauling.

Mitigations:
The DNRC is a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction
Recommended Mitigation Measures for Air Quality- The analysis and levels of effects to air quality are based on implementation of the following mitigation measures:

- Only burn on days approved by the Montana/Idaho Airshed group, Powell County, and DEQ.
- Conduct test burn to verify good dispersal.
- Dust abatement may be used as necessary.

Comment Number 2: Quantity and Distribution of Employment

Impact
According to the Montana Bureau of Business and Economic Research, a general rule of thumb is that for every million board feet of sawtimber harvested in Montana, ten person-years of employment occur in the forest products industry.

This harvest is viewed as a continuation of a sustained yield and as such would not create any new jobs but rather sustain approximately 40 person-years of employment in the forest products industry. A few short-term jobs would also be created/sustained by issuing pre-commercial thinning and planting contracts following harvest. Additionally, local

businesses, such as hotels, grocery stores, and gas stations would likely receive additional revenues from personnel working on the proposed project. This would be a positive low impact to quantity and distribution of employment in the area.

Mitigations: This impact would be positive, and mitigations would not be necessary.

OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

The proposed action has a projected harvest volume of 3-4 MMBF (million board feet). This volume is worth approximately $178.00/thousand board foot (MBF) delivered to a forest products manufacture site at current market prices. Delivered to market, the proposed action has a total estimated revenue value of $623,000. Removing the timber sale purchaser's contracted operations and DNRC's development, administration, and operation expenses, the trust beneficiaries net between an estimated 15 and 35 percent of total delivered sawlog market value. Therefore, the proposed action may generate net income for trust beneficiaries between $93,450 and $218,050.

Costs related to the administration of the timber sale program are only tracked at the Land Office and Statewide level. DNRC does not track project-level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product sales program. Revenue and costs are calculated by land office and statewide. These revenue-to-cost ratios are a measure of economic efficiency. A recent revenue-to-cost ratio of the Southwest Land Office was 1:1.82. This means that, on average, for every $1.00 spent in costs, $1.82 in revenue was generated. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return.

Mills in Montana need 437 MMBF per year to maintain current production levels and industry infrastructure. Currently the Sustained Yield and target harvest from Trust Lands is 56.9 MMBF, which represents approximately 16.2% of timber harvested in the state of Montana. This project would provide approximately 3.5 MMBF of timber towards the Sustained Yield target thus helping sustain current mill capacity.

Environmental Assessment Prepared By:

Name: Cynthia N. Super
Title: Clearwater Unit, Management Forester
Date: Sep 19, 2019

Finding

Alternative Selected

After thorough review of the Pearson Patches Projects Environmental Assessment (EA), project file, and public scoping, and, all applicable rules and plans, and laws, I have taken the decision to select the Action Alternative.

The Action Alternative meets the intent of the project objectives as stated in *Type and Purpose of Action* listed on page 3 of the EA. Specifically, the proposed project is expected to:

1) Generate net income between $93,450.00 to $218,050.00 for trust beneficiaries.
2) Promote increased stand health and diversity.
3) These projects will begin the steps to bring these stands back to historic conditions.
4) It will improve access and BMP compliance with new construction, road maintenance, and road closure by:

A) Relocation, stabilization, and closure of an estimated 2 miles.
B) Repair and maintenance of 31 miles of road that do not meet BMP's or DNRC guidelines.
C) Build 0.6 miles of new road to allow for above road closures.

5) Decrease of available stand fuel levels and overstocking to help reduce concerns of large wildfire and insect and disease concerns.

6) Decrease affects to the aesthetic concerns of the area. Use of topographical features, retention of large trees often at variable spacings, and use of grassy openings to break hard visuals lines that are currently visible.

Significance of Potential Impacts

The EA addressed the identifiable potential resource issues through proposed mitigation measures which incorporate all applicable rules, plans, guidelines, and laws.

This approach resulted in a project in which potential effects to several resources were expected to be negligible, minimal, minor, or low. These resources will not be discussed in further detail.

Others resulted in low to moderate or moderate expected effects. Specifically:

Weeds – Direct, indirect, and cumulative effects are expected to be moderate. However, this doesn't differ from the No Action Alternative effects. The Action Alternative would provide for more weed spraying than the No Action Alternative and provides mitigations through equipment cleaning and grass seeding.

Standard Vegetative Community – Direct, indirect, and cumulative effects are expected to be low to moderate. These effects reflect mitigations and harvest plans designed to benefit forest conditions through promotion of increased stand health and diversity, decreased fuel loading, and movement towards historic/desired future conditions.

Aesthetics – Direct and indirect effects are expected to be low to moderate. Proposed mitigations are expected to lessen the potential visual impacts and the visual impacts are expected to lessen or soften over time. Many of the aesthetic concerns within the area are the resulting effects of management of previous landowners. Their management plans were often different than DNRC concerns and actions of today.

Soils – Direct, indirect, and cumulative effects are expected to be low to moderate. Proposed mitigations along with contract administration are expected to control potential soil disturbance and avoid excessive impacts.

Water Resources – Direct, indirect, and cumulative effects to sediment are expected to be low to moderate. The sites are considered resilient and the proposed mitigations are expected to address potential impacts to water quality and reduce sedimentation and therefore result in an improvement in conditions when compared to the No Action Alternative.

Fisheries – There is a moderate risk of short term and low risk of long-term impacts to in-stream sediments effects to fish habitat associated with temporary increases in sediment during construction or culvert replacements. The proposed mitigations are expected to address potential impacts and the final sediment levels are expected to be lower and therefore an improvement in conditions when compared to the No Action Alternative. High cumulative effects due to fisheries connectivity issues will continue in the Chamberlain Creek Assessment Area, however, these sites will be added to the inventory included in the HCP AQ-FC Conservation Strategy and will be addressed under the timeframe identified in that commitment.

Wildlife – There is a moderate risk of adverse direct or indirect effects to big game winter range. However, no long-term effect to winter range carrying capacity or factors that would create long-term displacement or reduced numbers of big game would be anticipated.

I have determined that none of the anticipated environmental impacts outlined in the EA are significant according to the criteria outlined in ARM 36.2.524. I find that no impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of various resources, including any that may be considered unique or fragile, will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, and I find no conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to the extent that the impacts are not significant.

Need for Further Environmental Analysis

☐	EIS	☐	More Detailed EA	X	No Further Analysis

Environmental Assessment Checklist Approved By:

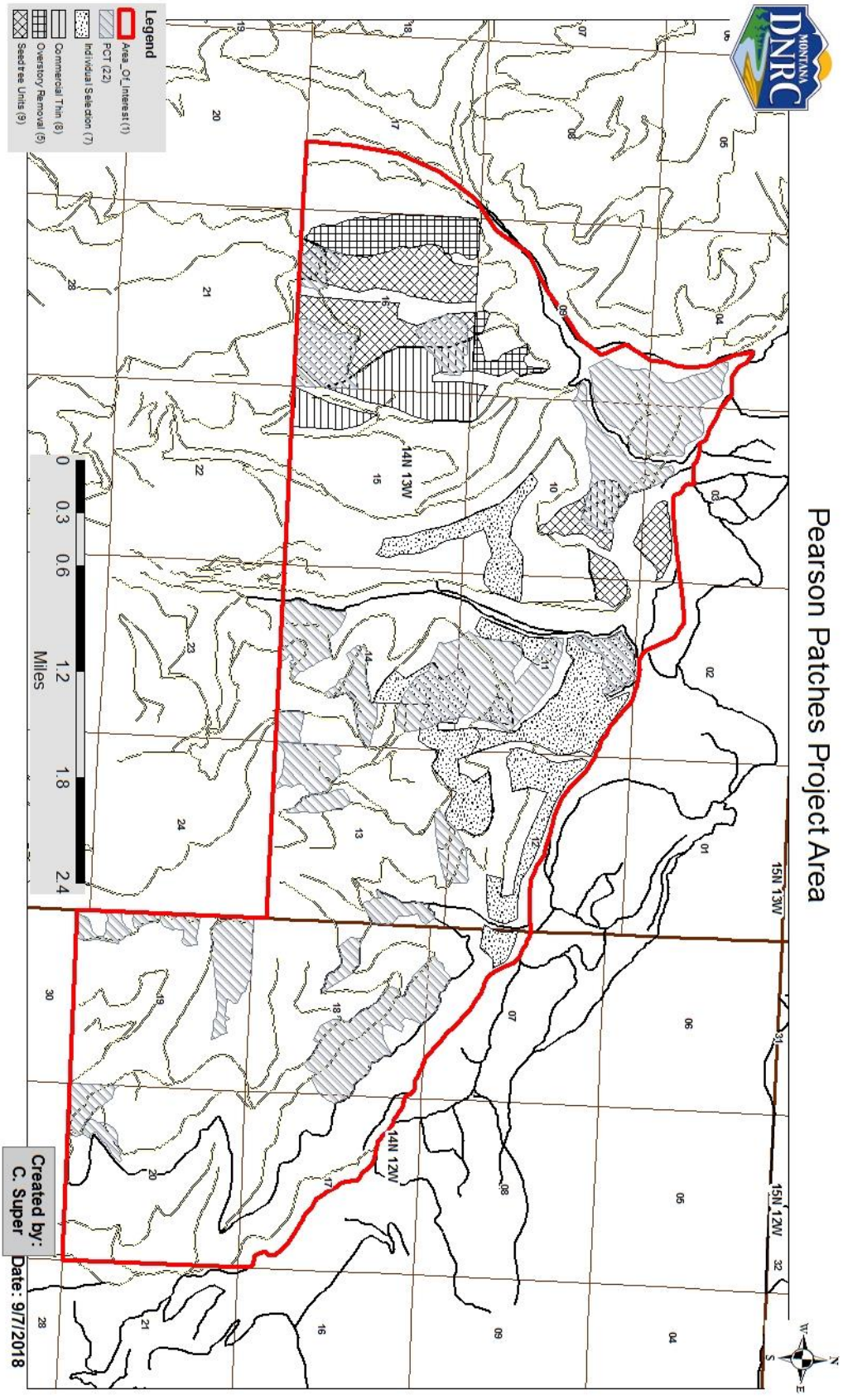
Name: Craig V. Nelson
Title: Clearwater Unit Management Forester Supervisor
Date: September 25, 2019
Signature: /s/ Craig V. Nelson

Clearwater Unit
48455 Sperry Grade Road
Greenough, MT.
59823

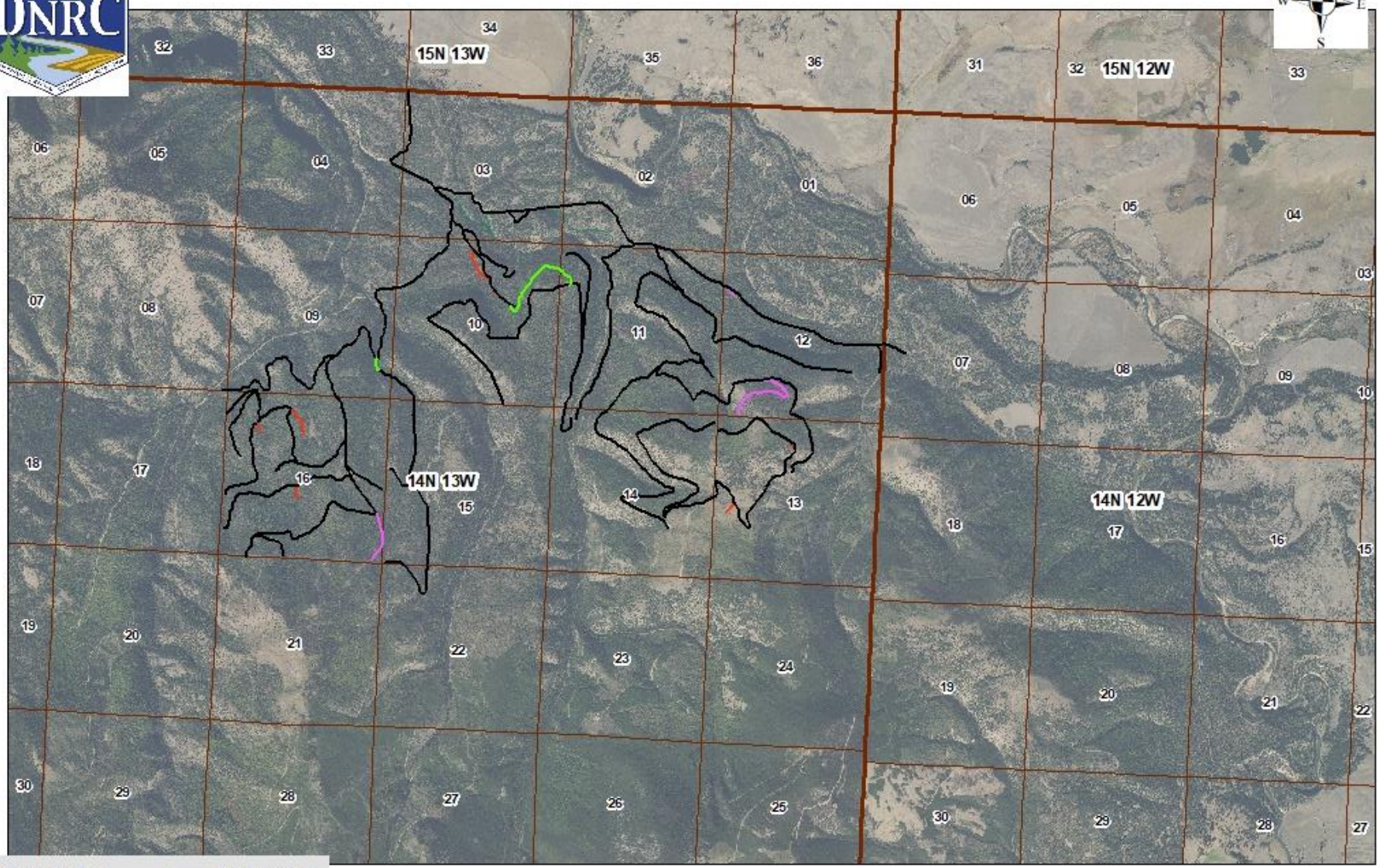
Persons with disabilities who need an alternative, accessible format of this document should contact the DNRC at the above address.

5 copies of this document were published at an estimated cost of $11.00 per copy.

Attachment A-Maps



Pearson Patches Commercial Roads



Trans_Plan

- Abandon
- Haul routes
- New Construction
- Reclaim
- Temporary Rd

0 0.275 0.55 1.1 1.65 2.2
Miles

Date: 8/6/2019 **C. Super**

Attachment B-Scoping and Responses

SCOPING LETTER

E-MAIL ON January 9, 2018

Initial Proposal
Pearson Patches Timber Sales

The Montana Department of Natural Resources and Conservation, Clearwater Unit, is proposing to harvest timber on the following state-owned parcels:

Sections 9, 10, 11, 12, 13, 14, 15, and 16 T14N R13W, Common Schools
Sections 7, 17, 18, 19, and 20 T14N R12W, Common Schools

The primary objective of this proposed project is to generate revenue over the long-term from the timber resources and provide a sufficient amount of sawlog volume to contribute to the DNRC's sustained yield. Silvicultural prescriptions would include seed tree, shelterwood, individual tree selection, and salvage harvest with traditional equipment to: promote healthy and biologically diverse forests, provide long-term income for the Trusts, bring stands closer to historic conditions, improve stand growth and vigor, and reduce the threat of future losses to fire, insects, and disease. Road maintenance, improvements, and new road construction may be necessary. Noxious weed management, property line surveys, pre- commercial thinning, prescribed burning (or pile burning) and tree planting may also occur under the proposed action.

The proposed harvest is in accordance with State Statute 77-1-202 and would contribute to the DNRC's sustained yield as mandated by state statute 77-5-222.

The proposed harvest would take place under various timber permits and sales. The proposal may harvest approximately 5 million board feet from approximately 2,000 acres. Additional management activities including pre-commercial thinning, planting, burning, etc may occur on a total of 7,300 acres. The proposed action would likely be implemented in the late summer of 2019 and possibly be completed by 2030.

The DNRC is in the scoping phase of the project environmental assessment so all volumes and acreages are preliminary estimates. In preparation for this project, specialists such as wildlife biologists, hydrologists, soil scientists, and archeologists will be consulted. Neighboring landowners will also be asked for their input.

The Montana DNRC invites comments and suggestions concerning this proposal from all interested parties. Please respond by **February 1, 2018** to:

Department of Natural Resources and Conservation
Attn: Cindy Super
Clearwater State Forest
48455 S. Sperry Grade Rd.
Greenough, MT 59823

or: email: **csuper@mt.gov**
or: **(406) 244-2385**

Project Update
Pearson Patches Timber Sales

The Montana Department of Natural Resources and Conservation, Clearwater Unit, is proposing to harvest timber on the following state-owned parcels:

Sections 9, 10, 11, 12, 13, 14, 15, and 16 T14N R13W, Common Schools
Sections 7, 17, 18, 19, and 20 T14N R12W, Common Schools

And also:
Sections 2, 3, and 4 T14N R13W, Common Schools

The primary objective of this proposed project is to generate revenue over the long-term from the timber resources and provide a sufficient amount of sawlog volume to contribute to the DNRC's sustained yield. Silvicultural prescriptions would include seed tree, shelterwood, individual tree selection, and salvage harvest with traditional equipment to: promote healthy and biologically diverse forests, provide long-term income for the Trusts, bring stands closer to historic conditions, improve stand growth and vigor, and reduce the threat of future losses to fire, insects, and disease. Road maintenance, improvements, and new road construction may be necessary. Noxious weed management, property line surveys, pre- commercial thinning, prescribed burning (or pile burning) and tree planting may also occur under the proposed action.

The proposed harvest is in accordance with State Statute 77-1-202 and would contribute to the DNRC's sustained yield as mandated by state statute 77-5-222.

The proposed harvest would take place under various timber permits and sales. The proposal may harvest approximately 5 million board feet from approximately 2,000 acres. Additional management activities including pre-commercial thinning, planting, burning, etc may occur on a total of 7,300 acres. The proposed action would likely be implemented in the late summer of 2019 and possibly be completed by 2030.

The DNRC is in the scoping phase of the project environmental assessment so all volumes and acreages are preliminary estimates. In preparation for this project, specialists such as wildlife biologists, hydrologists, soil scientists, and archeologists will be consulted. Neighboring landowners will also be asked for their input.

The Montana DNRC invites comments and suggestions concerning this proposal from all interested parties. Please respond by **March 15, 2019** to:

Department of Natural Resources and Conservation
Attn: Cindy Super
Clearwater State Forest
48455 S. Sperry Grade Rd.
Greenough, MT 59823

or: email: **csuper@mt.gov**
or: **(406) 244-2385**

Region 2 Office
3201 Spurgin Road
Missoula, MT 59804-3101
406-542-5500
Fax 406-542-5529
February 7, 2014

Montana Fish, Wildlife & Parks

Cindy Super
Clearwater State Forest
48455 S Sperry Grade Rd
Greenough, MT 59823
csuper@mt.gov

Reference: Pearson Patches timer sales (DNRC managed lands in Powell County in portions of T14N R13W and T14N R12W)--Scoping

Dear Ms. Super:

Montana Fish, Wildlife & Parks (FWP) appreciates this opportunity to respond to the Montana Department of Natural Resources & Conservation's (DNRC) scoping notice for this proposed timber sale to harvest approximately 5 million board feet on approximately 2,000 acres of DNRC land in the Chamberlain Creek and middle Blackfoot River area. Additional management activities (thinning, planting, burning) could take occur on 7,300 acres. Our comments follow.

FWP holds the North Chamberlain Conservation Easement (CE), which covers most or all the land being considered for the Pearson Patches timber sales. The CE requires DNRC to follow special management provisions regarding timber management, noxious weed management and road construction activities, that are intended to protect and safeguard fish and wildlife habitat. Please refer to the CE during project development and feel free to contact the following FWP personnel for further help or consultation:

1. Kevin League, conservation easement program manager (phone 444-3762 in Helena, kleague@mt.gov)
2. Ron Pierce, fisheries biologist for the Blackfoot drainage (phone 542-5532 in Missoula, rpierce@mt.gov);
3. Scott Eggeman, Blackfoot area wildlife biologist (phone 542-5542 in Seeley Lake, seggeman@mt.gov)

Again, we appreciate this opportunity and look forward to working with your foresters and biologists in an area that has resources important to and prioritized by both agencies.

Sincerely,

/S/ Randy Arnold

Randy Arnold
Regional Supervisor
RA/sr

Weyerhaeuser

February 19, 2019

Cindy Super
DNRC-Clearwater Unit
48455 S. Sperry grade Rd.
Greenough, MT 59823

Dear Ms. Super,

This letter is in support of the Pearson Patches Timber Sale proposal. The project description outlined in your Initial Proposal letter describes the need for the project and the methods to achieve the desired future condition. Fuels reduction, forest health improvement, and the sale of forest products are critical for school trust lands.

Weyerhaeuser operates three manufacturing facilities located in Northwest Montana and employs approximately 500 people. Logs from Department of Natural Resource and Conservation projects are an important source of raw materials for our operations. Specifically, the opportunity to purchase logs produced from the Pearson Patches Timber Sale is significant to our fiber supply to help sustain our manufacturing businesses.

Weyerhaeuser hopes that any decision made regarding the implementation of this project will consider its importance to our employees and their respective communities.

Thank you for your consideration.

Sincerely,

Jared Richardson, CF
Montana Raw Material Manager

Attachment C-Vegetative Analysis

Analysis Prepared By:

Name: Cindy Super - Forest Vegetation & Andrea Stanley - Noxious Weeds
Title: Management Forester, Clearwater Unit, Montana DNRC & Hydrologist/Soil Scientist, Southwest Land Office, Montana DNRC

Introduction

The vegetation section describes present conditions and components of the forest as well as the anticipated effects of both the No Action and the Action Alternatives.

Issues

No-Action Alternative:

- Mistletoe in all species, root rot, Doug fir beetle, mountain pine beetle, and western spruce budworm may continue to suppress productivity/growth or cause mortality in the project area.
- Young stands are currently overstocked.
- Shade tolerant species would continue to out-compete seral species, removing stands from their historic cover type and species distribution.
- Fuel loads/stand conditions are above historic levels; which may lead to high-intensity stand replacing fires.

Action Alternative:

- Timber harvesting and road building may introduce or spread noxious weeds in the project area.
- Phenotypically inferior leave trees from past harvests would be removed to promote better stand genetics.
- Stand productivity and tree health/vigor would be increased, insuring long term sustainability of product yield.
- Shade tolerant species would be preferred for removal and no longer continue to out-compete seral species, helping to return stands to their historic cover type, desired future condition (DFC), and species distribution.

Regulatory Framework

The following plans, rules, and practices have guided this project planning and/or will be implemented during project activities:

State Forest Land Management Plan
DNRC developed the SFLMP to "provide field personnel with consistent policy, direction, and guidance for the management of state forested lands" (DNRC 1996: Executive Summary). The SFLMP provides the philosophical basis, technical rationale, and direction for DNRC's forest management program. The SFLMP is premised on the philosophy that the best way to produce long-term income for the trust beneficiaries is to manage intensively for healthy and biologically diverse forests. In the foreseeable future, timber management will continue to be the primary source of revenue and primary tool for achieving biodiversity objectives on DNRC forested state trust lands.

DNRC Forest Management Rules
DNRC Forest Management Rules (*ARM 36.11.401 through 456*) are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program. The Forest Management Rules were adopted in March 2003 and provide the legal framework for DNRC project-level decisions and provide field personnel with consistent policy and direction for managing forested state trust lands. Project design considerations and mitigations developed for this project must comply with applicable Forest Management Rules.

Montana Best Management Practices (BMPs) for Forestry
Montana BMPs consist of forest stewardship practices that reduce forest management impacts to water quality and forest soils. The implementation of BMPs by DNRC is required under *ARM 36.11.422*. Key forestry BMP elements include: streamside management; road design and planning; timber harvesting and site preparation; stream crossing design and installation; winter logging; and hazardous substances storage, handling, and application.

Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP)
DNRC is managing the habitats of threatened and endangered species on this project by implementing the Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP) and the associated Incidental Take Permit that was issued by the United States Fish & Wildlife Service (USFWS) in February of 2012 under Section 10 of the Endangered Species Act. The HCP identifies specific conservation strategies for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. This project complies with the HCP.

North Chamberlain Conservation Easement
This easement granted to Montana Department of Fish, Wildlife & Parks by the Montana DNRC. The purpose of the easement is "to preserve, and protect, in perpetuity the conservation values of the land… to perpetuate the Land as forest land; to ensure the opportunity for forestry activities permitted hereunder; and to provide that any commercial production of forest products is conducted in accordance with the Standards for Forest Management." Further purpose is to "grant…the right of access…for public recreational use, including hunting" and also "to prevent the Land… from being converted or diverted to any use prohibited by provisions of this Easement…" and to "allow the continuation of such forest management in accordance with the Standards…"

Noxious Weed Applicable Weed Management Requirements The following plans, rules, and practices have guided this projects planning and/or would be implemented during project activities: All applicable weed management requirements of the County Weed Control Act 7-22-2101 to 7-22-2153, Best Management Practices, State Forest Land Management rules and regulations, and measures outlined in the DNRC Habitat Conservation Plan would be implemented. This includes but is not limited to management rules for classified forest lands ARM 36.11.445 where the department shall use an integrated pest management approach for noxious weed management that includes prevention, education, cultural, biological, and chemical methods as appropriate.

Analysis Areas

Direct and Secondary Effects Analysis Area
The proposed treatment areas – 2,720 acres (harvest and pre-commercial thinning areas)

Cumulative Effects Analysis Area
The proposed project area – 7,800 acres (all acres including riverbeds)

Existing Conditions

Noxious Weeds

Noxious weeds occurring in the project parcels are mainly a combination of spotted knapweed (*Centaurea maculosa*), houndstongue (*Cynoglossum officinale L*), leafy spurge (*Euphorbia esula)*, and spot infestations of Canada thistle (*Cirsium arvense*) and St Johnswort (*Hypericum perforatum)*. Knapweed was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides along the access haul routes within project sections and on adjacent lands. Orange hawkweed (*Hieracium aurantiacum*) occurs in the area but has not been noted on the project sites. Road use, livestock and wildlife grazing, timber harvest activities, recreational uses, and soil disturbance (including from fire) are most likely the reasons for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds. Moist sites with well-established surface vegetation provide a competitive advantage over noxious weed establishment. Reseeding of some roadcuts followed by roadside, spot herbicide treatments and release of bio-control insects have been made on noxious weeds on portions of all the project sections and this has helped reduced the spread of noxious weeds. DNRC has completed considerable herbicide treatments and revegetation on forest management projects for the last 10 years, coupled with weed treatments by the Montana Department of Fish, Wildlife & Parks (FWP) and Bureau of Land Management (BLM) on system roads. Weeds continue to spread by wind, animals and vehicles. Weed management treatments on adjacent ownerships in the area varies from no action to combinations of revegetation, herbicide treatments and bio-control measures.

Rare Plants

The Montana Natural Heritage Program has identified five possible rare vascular plants that may occur within the general vicinity of the project area.

- English Sundew (*Drosera anglica*) would primarily be found in riparian areas, rivers, lakes, or sloughs.
- Blunt-leaved pondweed (*Potamogeton obtusifolius*) would primarily be found in riparian areas, rivers, lakes, or sloughs.
- Beck water-marigold (*Bidens beckii*) is an aquatic perennial herb with lower stems that are submerged and upper portions usually emergent.
- Pygmy Water-lily (*Nymphaea leibergii*) is an herbaceous perennial with stems that are submerged and floating leaves.
- Howell's Gumweed (*Grindelia howellii*) is a sensitive plant that has limited distribution across portions of Powell and Missoula Counties. In some areas, the populations are well established. This gumweed responds like a pioneer species and requires disturbance for an effective germination substrate. Its habitat is not limited to riparian areas and in fact it is often found on roads or disturbed surfaces.

Standard Vegetative Community

- **Stand History/Past Management**
  This area falls within climatic section 332B. Section 332B was historically 79% forested (Losensky, 1997). Climatic Section 332B includes valley bottoms as well as high elevations in the Bitterroot and Blackfoot region. The project area ranges in elevation from 4,000'-6,000'. These areas were historically dominated by large, mature ponderosa pine and western larch / Douglas-fir stands. Fire played a large role in shaping these stands. Throughout the project area there is evidence of both infrequent stand replacing fires and light ground fires. Evidence (fire scars on 200+ year old western larch, ponderosa pine, and Douglas-fir trees and stumps from previous harvests) found during field reconnaissance indicates that these fires burned in the 1800s through today. It is certainly believable that this fire occurrence proceeded that date.

Although fire shaped these stands prior to the arriving of European settlers, much of this area has been treated by timber harvesting since. Harvest has occurred in this area since the late 1880's. Previous treatments were not necessarily done with the same goals as they are currently. As a result, some stands regenerated to a different tree species than the expected appropriate condition.

Some DNRC sales have occurred on these parcels. Our records show treatments as recent as 2011 and dating back to the 1930s and given the history of the area one may assume there were treatments prior to that decade. The bulk of parcels in the area (Sections 2, 3, 4, and 9-15 T14N R13W and Sections 7 and 17-20 T14N R12W) were acquired by the DNRC in 2010 as part of the North Chamberlain Land Acquisition with The Nature Conservancy (who purchased the property from Plum Creek Timber Company) and the precise management history is uncertain beyond the fact that there has been extensive previous harvest.

- **Current stand conditions (species composition, size, density, insects and disease, forest age class and distribution, etc.)**

Information for the current stand condition and desired future condition (DFC) was gathered using the DNRC's Stand Level Inventory as well as visual inspection of the existing ground. The current stand condition in the project area is a result of past timber management and wildfire activity and/or suppression. Current cover types differ from the DFC. See table V-1 for current project area cover types as well as the DFC for the project area.

Table V-1 – Current and appropriate cover type for the Pearson Patches Projects Area.

Cover Type	Current Acres	Current Percent of Project Area	Desired Future Condition (DFC)	
			Acres	Percent
Douglas-fir	2412	31%	582	7%
Lodgepole pine	593	8%	591	8%
Mixed conifer	322	4%	36	<1%
Ponderosa pine	0	0%	1,198	15%
Western larch/Douglas-fir	3625	46%	5,362	69%
Western larch	725	<1%	0	0%
Non-stocked	92	1%	0	0%
Non-forest	31	<1%	31	<1%
TOTAL	*7800*		*7800*	

Please note; rounding was used in the above table to achieve the given acreages within the sections in this sale.

Most of the stands within the sale area show an increase of Douglas-fir. Trees such as Douglas-fir often regenerate at a more successful rate than trees such as ponderosa pine or western larch (the desired species).

Previous logging practices caused some of these changes. Harvest practices of the late 1800's targeted the best quality trees and leaving lesser quality trees. This was done using crosscut saws and fewer cuts meant less work. The best quality trees were usually western larch or ponderosa pine.

By the late 1940's, most harvesting operations used chainsaws for harvesting. This also included a change in the silvicultural practices, often seed tree or shelterwood harvests. The overstory that was reserved to produce

regeneration was harvested after regeneration occurred. The removal of these trees has reduced the larger component of stems on the site, which obviously affects the amount of "old growth" area. This regeneration often included Douglas-fir. The general mindset was to include the maximum number of spaced trees per acre. On some of the sites, the previous owners continued to remove trees of different species and sizes as time went on. These stands now show a change to Douglas-fir and away from western larch or ponderosa pine.

The overstory across the area consists of 11% Douglas-fir, 6% ponderosa pine, and 43% western larch/Douglas-fir (although these stands are heavier to Doug fir). Lodgepole pine, which was heavily impacted by mountain pine beetle, accounts for 8% of the overstory and subalpine fir makes up 7%. The heaviest overstory removal (50-75%) would be in the Douglas-fir in an effort to move these stands towards desired future condition of Doug-fir/Larch or ponderosa pine.

Stands within the area have average diameters of 12 inches. Average height across stands is 60 feet. The volume over the area is approximately 3 mbf (thousand board feet) per acre. The "smallest" stand results (not including non-forested stands) had stand DBH of 1, stand height of 10 feet, and zero mbf per acre; the "largest" stand totals were 19 inches at breast height, 100 feet tall, and the volume of 11-15 mbf. per acre. Harvest of the largest diameter trees will be less than 50% of the existing stand.

Armillaria root disease is present in much of the area as well as large pockets of mortality from mountain pine beetle, Douglas-fir beetle, spruce budworm, and most recently snow/wind throw. The recent damage from snow is primarily in the second story Douglas-fir. Mistletoe is present in all species.

Old Growth

Old Growth is identified and analyzed using criteria outlined in Green et al. (1992). Stand Level Inventories of the project area were queried to identify potential Old Growth and Old Growth stands. Stands are categorized as: Possible, Yes, No, and Field Verified. None of the stands have been identified as old growth

Table V-2 –Old Growth in project area

Stand ID (as classified by DNRC Stand Level Inventory)	SLI Old Growth Status	Acres	*Field Verified Old Growth Status	Old Growth Type	Acres of verified Old Growth
N/A					
TOTAL					

Environmental Effects

Noxious Weeds

No-Action Alternative:

Direct, Indirect, and Cumulative Effects

With no action, noxious weeds will continue to spread along roads and may increase on the drier site habitats. Limited weed control efforts on access roads across multiple ownerships in the area increases the potential for spreading seed. Following disturbance events such as fires or grazing, the establishment and spread of noxious weeds can be more prevalent than in undisturbed areas. DNRC would continue to treat selected sites on DNRC roads based on priorities and funding availability, but the levels of weed control treatments would be lower than with the action alternative. If new weed invader species are found, they will have highest priority for management.

Cumulative effects of noxious weeds within the project areas are moderate. Weeds have spread across ownerships over time and are prone to more dispersal along open roads. Weeds also have spread by multiple uses from wind, fire, traffic, forest management, wildlife and grazing animals. As tree density and ground cover vegetation increase, weeds are reduced through vegetative competition.

Action Alternative:

Direct, Indirect, and Cumulative Effects

Implementation of the action alternative will involve ground-disturbing activities that have the potential to introduce or spread noxious weeds in susceptible habitat types. For the action alternative, an Integrated Weed Management (IWM) approach was considered for treatment of existing and prevention of potential noxious weeds. For this project, prevention, revegetation and weed control measures on existing roads and for spot outbreaks are considered the most effective weed management treatments. Prevention measures include cleaning off-road equipment. Roadsides may be sprayed prior to operations and weed control and revegetation would slow noxious weed spread and reduce weed density and occurrence compared to no-action. There would be a similar or potential slight increase in weed infestation with harvest units due to soil disturbance (refer to soil section) and reduction of tree canopy. The silvicultural prescriptions and seasons of harvest are designed to minimize disturbance and scarification to only that which is needed for sustained forest growth. Noxious weeds control efforts will promote rapid revegetation and emphasize treatment of any new noxious weeds found.

Herbicide application would be completed on segments of DNRC roads along the haul route to reduce weed spread along roads and promote desired vegetation for weed competition and to reduce sedimentation. Herbicide would be applied according to labeled directions, laws and rules, and would be applied with adequate buffers to prevent herbicide runoff to surface water resources. Implementation of IWM measures listed in the mitigations are expected to reduce existing weeds, limit the possible spread of weeds, improve current conditions, and promote existing native vegetation. More weed control would occur compared to the no-action alternative and grass and competitive vegetation would increase along roads.

Overall, cumulative effects of increased noxious weeds within the project area are expected to be moderate based on herbicide treatments of existing weeds along roads and implementing prevention measures to reduce new weeds. The combined efforts of weed control across ownerships continues to improve through cooperative efforts with the Missoula County Weed District, Powell County, Montana Fish Wildlife and Parks, the Bureau of Land Management, and local weed control interest groups including the Blackfoot Challenge.

Rare Plants

No Action Alternative:

Direct, Indirect, and Cumulative Effects

The No Action alternative would not change the existing conditions available for Howell's gumweed populations present within the proposed area. No disturbance would occur. As a result, there would be low risk of direct, indirect, and cumulative effects to Howell's gumweed given the No-Action Alternative.

Action Alternative:

Direct, Indirect, Cumulative Effects

If a population is found, disturbance would be limited, and since Howell's gumweed is often found in disturbed areas, and the gumweed population should remain the same or would slightly increase if plants establish on reclaimed road sites. Some individual plants would likely be killed if present during timber harvest. Core populations would be protected and potentially enhanced through the ground disturbance nearby. If a population is found, mitigations would be put in place during herbicide application to protect the plants.

Given the limited area that Howell's gumweed inhabits and the protective measures that will be taken, there will not be any adverse cumulative effects. There may be an increase in the gumweed population as disturbance would cause an

increase in adequate germination substrates. As a result, there would be low risk of direct, indirect, and cumulative effects.

Standard Vegetative Community

No Action Alternative:

Direct, Indirect, and Cumulative Effects

Under the No Action alternative, natural processes would continue to have a direct impact on forest conditions within the Project Area. The proposed harvest, road building and closures, burning, and pre-commercial thinning would not occur. These stands would remain at overstocked levels and are they are currently under the possible insect and disease threat of mountain pine beetle (*Dendroctonus ponderosae*) and spruce budworm (*Choristoneura occidentalis*). Many existing roads are in poor locations. Concerns regarding overstocked stands and fire danger from them would continue. Current threat of uncontrollable fire conditions would not be lessened in this area. All pre-commercial stands would continue to grow with decreased vigor and would show more death within the stand. As a result, there would be low to moderate risk of direct, indirect, and cumulative impacts to the vegetative community given the No Action alternative.

Action Alternative:

Direct, Indirect, and Cumulative Effects

This proposal includes timber harvest on approximately 1,470 acres removing an estimated 3-4 million board feet. Pre-commercial thinning will also occur under this EA on a proposed 1,250 acres. Treatment type and size would vary based on stand conditions. The proposed treatment types would include:

Seedtree: Seedtree harvest is a traditional prescription that is a "regenerative" harvest. This is designed to produce regeneration of a preferred tree species that has been chosen and has be left as a seed source above the regeneration. These stands within the project area are generally higher percentage of Douglas-fir and do not have an understory that could be managed after harvest. Spacing after harvest is predicted to be variable and would be based upon the individual tree characteristics. The reduction of the overstory and treatment of the existing pole size and understory trees generally causes a stand to produce regeneration of the remaining overstory. The reduction of the total Douglas-fir number of the overstory, and a percentage increase of other species (ponderosa pine and western larch) would promote a stand closer to pre-settlement times. The proposed stand density would make limited resources (light, water, and nutrients) more plentiful for the residual overstory trees and potential regeneration. These changes would continue the progression toward the Desired Future Condition.

Overstory Removal: Stands proposed for this treatment were previously logged, Douglas fir or lodgepole pine stands or are in very poor health. This harvest is prescribed to remove dead and dying overstory trees. Most of these trees have not responded to the previous treatments or are being attacked by insects.

ITS (Individual Tree Section): The goal would be to retain heathy seral species (PP or WL) exhibiting desirable phenotypical attributes (good form, no forked tops, no crook, sweep, etc.). Residual overstory spacing would be variable or clumpy depending on stand health and could average 30-50 ft; an average basal area of 15-25 square feet per acre would remain. Basal area is defined as the total cross-sectional area of all stems in a stand measured at breast height and expressed as per unit of land area (square feet per acre). Post-harvest stand appearance would resemble a natural disturbance with scattered clumps remaining as well as unevenly spaced overstory trees. Approximately 50-75% of the total canopy would be removed using this treatment.

Commercial Thinning: The treatment of commercial thinning is defined as removing small trees with some monetary benefit but the primary objective in the stand is to reduce stocking, release of limited nutrients (water, light, and nutrients), and improve growth of desired trees. It has also proven to decrease the loss of deterioration through death and poor growth over a longer time period, especially on poor sites. Old Growth is not a concern within this size class.

Pre-Commercial Thinning: The treatment of pre-commercial thinning is defined as removing small trees not for monetary benefit but to reduce stand stocking, release of limited nutrients (water, light, and nutrients), and improve

growth of desired trees. It has also proven to decrease the loss of deterioration through death and poor growth over a longer time period, especially on poor sites. Old Growth is not a concern within this size class, but there are concerns for Canada Lynx in this area.

At least two snags and two snag recruits per acre (where available) would exist scattered among the overstory component of all harvest units. If snags were not available, 4 snag recruits would be left.

Healthy, vigorous advanced regeneration exhibiting good form would be protected during harvest activities.

Harvest would not occur within the first 50 feet of Class One Streamside Management Zones (SMZ). Depending on slope, these areas vary from 50 feet -100 feet from the stream. Harvest may take place within Class 3 Streamside Management Zones or around Wetland Management Zones (WMZ) or within Riparian Management Zones (RMZ). Trees to cut would be concentrated along the outer edges to ensure protection along stream banks.

Fuel loading concerns would vary according to the pre-harvest stand. In accordance with ARM 36.11.410 and ARM 36.11.414 most of the fine foliar slash and approximately 5 to 15 tons of coarse woody debris would be left scattered on the forest floor in all harvest units. This would increase the intensity and reduce the ability to control ground fires in all harvest units for approximately three years. In stands that have numerous leave trees following harvest, this could result in ground fires killing trees and an increased risk of crown fires. In areas with few leave trees the risk of a catastrophic crown fire would decrease.

Given the following factors:

- Douglas-fir across all size classes are currently succumbing to root-rot, spruce budworm, and Doug-fir beetle, due in part to overstocking.
- Post-harvest, the overall stand health and vigor would be improved in the residual overstory.
- More shade tolerant species would be removed, favoring seral species.
- Areas would be pre-commercially thinned increasing growth and vigor in young age classes.
- Post-harvest conditions would represent a more diverse age and species class within the project area; promoting resiliency to insect and disease damage.

The proposed action would be expected to result in low to moderate direct, indirect, and cumulative impacts on forest vegetation beyond those projected for the No Action alternative.

Old Growth

No Action Alternative:

Direct, Indirect, and Cumulative Effects

The No Action alternative would not change the existing conditions available within the proposed area. No disturbance would occur as part of the no action alternative. It is likely that given a longer time period, old growth acres would increase. At the same instance, the stands that occur currently would be at larger risk for wildfire. As a result, there would be low risk of direct, indirect, and cumulative effects to old growth given the No-Action Alternative.

Action Alternative:

Direct, Indirect, and Cumulative Effects

Based on a search of the Stand Level Inventory system, no Old Growth stands exist within the project area (as defined by Green et. al.). The proposed action would be expected to result in low to moderate direct, indirect, and cumulative impacts on Old Growth beyond those projected for the no action alternative.

Vegetation Mitigations

- Favor western larch and ponderosa pine in harvest areas and pre-commercial thinning to shift species represented toward the accepted Desired Future Condition.
- Plant western larch and ponderosa pine in planting blocks to shift species represented toward the accepted Desired Future Condition.
- Prescribe a selection harvest in order to emulate natural disturbance historically present on the landscape.
- Wash equipment prior to harvest to limit weed seed dispersal.
- Spray weeds along roadsides to limit spread of existing weed, while preventing weed spraying within Howell's gumweed populations.
- Plant grass on newly disturbed road surfaces to limit the resources available for weeds to become established.

Recommended Mitigations and Adjustments of Treatments for the Benefit of Other Resources

- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.
- No harvest would occur near within 50 feet of Class 1 streams.

VEGETATION REFERENCES

MT DNRC, Environmental Assessments of the past DNRC timber sales including: Good Shepherd, Clearview, Kozy Korner, and minor salvage permits at the Clearwater Unit, Southwestern Land Office.

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Attachment D-Soil Resources Analysis

Analysis Prepared By:
Name: Andrea Stanley
Title: Hydrologist/Soils Scientist, Montana DNRC

Introduction

The following analysis will disclose anticipated effects to soil resources within Pearson Patches project area. Direct, secondary, and cumulative effects to soil resources of both the No-Action and Action alternatives are analyzed.

Issues

Timber harvest, site preparation, road construction/maintenance, and vegetation management can alter factors that influence short-term and long-term soil health and productivity. Soil productivity must be maintained to sustain ecological resilience and productivity which in turn will maintain long-term return to state trust beneficiaries.

Soil resources may be adversely affected by implementation of the project. Issues include the following:

- slope stability
- erosion
- physical disturbance (compaction and displacement)
- nutrient cycling and soil productivity

Evaluating for the above issues will address issues raised during project scoping and will also include accounting for commitments associated with the North Chamberlain Conservation Easement (CE; FWP, 2010). Compliance with the regulatory framework listed in the following section is also assumed and accounted for in this analysis. Soil resource related comments received during scoping were limited to comment from the Montana Fish Wildlife and Parks, which consisted of reference to the existing CE (1/11/18).

The issues listed above are discussed in greater detail below:

Erosion

Water and/or wind erosion of soils is a natural process that can be accelerated by activities that:

- remove cover materials that protect the soils from erosion such as vegetation, woody debris, and duff.
- increase surface flow by reducing infiltration capacity, concentrating runoff, and/or reduced vegetative interception and/or transpiration.

Accelerated erosion generally equates to soil losses that exceed what would occur naturally and losses that exceed the natural regeneration of soil. Soil erosion can have secondary effects including sedimentation of surface waters. Analysis of road erosion and drainage issues is in the following water quality section because of the propensity of road erosion and drainage issues to effect water quality. Hillslope, including skid trail, erosion is analyzed in this section.

Types of erosion include sheet, rill, and gulley erosion. Site sensitivity to erosion accelerated by site activities are governed by existing site conditions such as soil composition (minerology and grain size distribution), slope, and past management practices such as effective use best management practices (BMPs).

Physical disturbance (compaction and displacement)

Soil compaction may occur when equipment or other materials moves or is placed on soils. It is a process in which soil bulk density is increased and macro porosity is decreased, which results in a platy, massive soil structure in more severe cases. Associated is a decrease in infiltration rate, permeability, and soil aeration.

Soil displacement is a process in which soil is displaced mechanically by the movement of equipment or other materials over soils. Soil displacement can reduce the amount of soil nutrients and moisture capacity available to plants and may expose less fertile subsoils and mineral soils. Soil displacement can increase potential for runoff and erosion.

Nutrient cycling and Soil productivity

Soil nutrient availability and natural replenishment by the breakdown of organic matter and rock weathering are essential to forest productivity and sustainability.

Coarse (CWD) and fine (FWD) woody debris provides many necessary functions to sustain soil productivity and includes site moisture retention, soil temperature modification, soil protection, nutrient cycling as well as providing a long-term supply of soil wood which is paramount to soil microbial activity (Harmon et al. 1986). Amounts of CWD and FWD are quantified by tons/acre which is calculated from transects as described in the Analysis Methods section. These values can vary within a project area and are dependent on factors such as those that influence moisture and decay rates and factors that affect tree and limb mortality. Forest management activities have the potential to modify both amounts and trends of recruitable material and in turn the long-term productivity of the soil.

Slope stability

Slope stability is the ability of material on a slope to remain in equilibrium (stable) and therefore represents some balance between driving forces (shear stress) and resisting forces (shear strength). Many variables, both natural and/or anthropogenic, may affect either driving or resisting forces. Factors that govern shear strength are the internal friction of the slope (determined by factors associated with the composition of the material on the slope such as grain size and shape, the presence of plane surfaces, moisture, and minerology). Activities that increase shear stress are removal of lateral support (e.g., erosion and road cuts) and increased moisture associated with reduced vegetation (interception and transpiration).

The risk of slope instability on state lands is small because the area subject to instability occurs in localized areas in less than six percent of all lands (State Plan). Slopes over 65% are considered the highest risk of instability because 65% is the normal angle of repose and stability for most landscape materials. These areas often have shallow soil mantles with exposed bedrock that are stable (State Plan). Based on observation and professional judgment, road construction and recent fire on slopes greater than 45% are the areas on state land that warrant an analysis for slope stability.

Regulatory Framework

The following plans, rules, and practices have guided project planning and/or would be implemented during project activities:

- The North Chamberlain Conservation Easement (CE) which includes Standards for Forest Management (2010)

- The Montana Department of Natural Resources and Conservation (DNRC) Forested Trust Lands Habitat Conservation Plan (HCP; USFWS and DNRC 2010)
- The Montana Code Annotated, specifically Title 77, Chapter 5.
- The Administrative Rules of Montana, specifically Rule Chapter 36.11
- The Montana Forestry Best Management Practices (Voluntary, but considered as management requirement for State Lands)
- The Montana Streamside Management Zone Law
- The State Forest Land Management Plan (DNRC, 1996)
- The Stream Protection Act (SPA)

Analysis Areas

The Pearson Patches project area is 7,470 acres of which 2,420 acres would be treated by commercial harvest and/or pre-commercial thinning. The analysis area for direct, and indirect effects to soil physical properties, nutrient cycling, and site productivity will be the 2,420 acres proposed for harvest units and landings. The effects of proposed road construction (0.7 miles) and existing road maintenance is assessed in the water quality analysis section of this EA.

Cumulative soil effects are defined in MEPA as the collective impacts on the human environment when considered in conjunction with other past, present, and future actions related the proposed action by location and generic type. Cumulative impact analysis includes a review of all known state and nonstate activities that have occurred, are occurring, or may occur that have impacted or may impact the same resource as the proposed action.

Cumulative effects to soil resources are analyzed here at the project area scale. Temporally, cumulative effects to soils resource are analyzed to include known past activities that have occurred, current management, and anticipated future activities and management within the project area.

Analysis Methods

This assessment begins with a characterization and evaluation of the **existing conditions** within the assessment areas. This informs both potential site sensitivities to soil impacts (e.g., steep and unstable slopes) and the likely condition that would persist under the No Action Alternative (e.g., existing disturbance areas). Below is a list of the data and analysis methods used for characterizing existing conditions:

- published geologic maps and reports
- topographic data and maps
- Natural Resources Conservation Service soil survey data
- Past and current DRNC land and forest management data
- DNRC grazing license and lease data
- On-site observations including observations on geology, soils, slopes, historic road and skid trails, vegetation, and CWD.

To evaluate the **potential environmental effects of the Action and No Action Alternatives** within the assessment areas we consider impacts typical to timber harvest, associated infrastructure and activities including skid trails, landings, vegetation/fuels management including slash treatment, weed management, and seeding/planting including soil prep such as scarification.

Note that the environmental effects associated with roads to soils include loss in soil and productive ground within the footprint of the road prism. The environmental effects of roads are analyzed more comprehensively in the water resources section of this EA because of the existing and potential risk associated with stream crossings and sediment delivery from road and fill surfaces.

Existing Conditions

Below is a summary of the key soil, geologic and geographic site conditions and findings for the project area:

- Rock types range from relatively hard and angular rocks (Precambrian quartzites and argillites) to soft and erodible fines (Tertiary silts and clays).
- Soils within the project area are gravel loams and vary in type of parent material. Soils are listed in Table S-1. Soils formed from Tertiary silts and clays, indicated as Ts in Figure S-1, are the softest and most erodible soils in the project area.
- Project area elevations range from 4,200 to 6,000 feet above mean sea level.
- Within harvest units, slopes range from 0 to 45%, with occasional steeper short (< 300 feet) pitches.
- Noxious weeds are present throughout the project area. Species and existing distributions are included in the Vegetation Analysis of this EA.
- Most of project area is recently-acquired industrial timber ground (except for Section 16 of 14N 13W) with associated existing road network, yarding, and landing disturbances.
- No unstable or unique geologic features have been observed in the project area.

Geology

The project area is located in the foothills of the Chamberlain Mountains on the southern flank of the Blackfoot River Valley. The project area is drained by tributaries to the Blackfoot river, including Chamberlain, Pearson, and Lobe Creeks. The local geology and rock types of the project area are described in geologic compilation completed by Lonn et al. (2010). Geologic information relevant to the project and project area is shown in the geologic map in Figure S1.

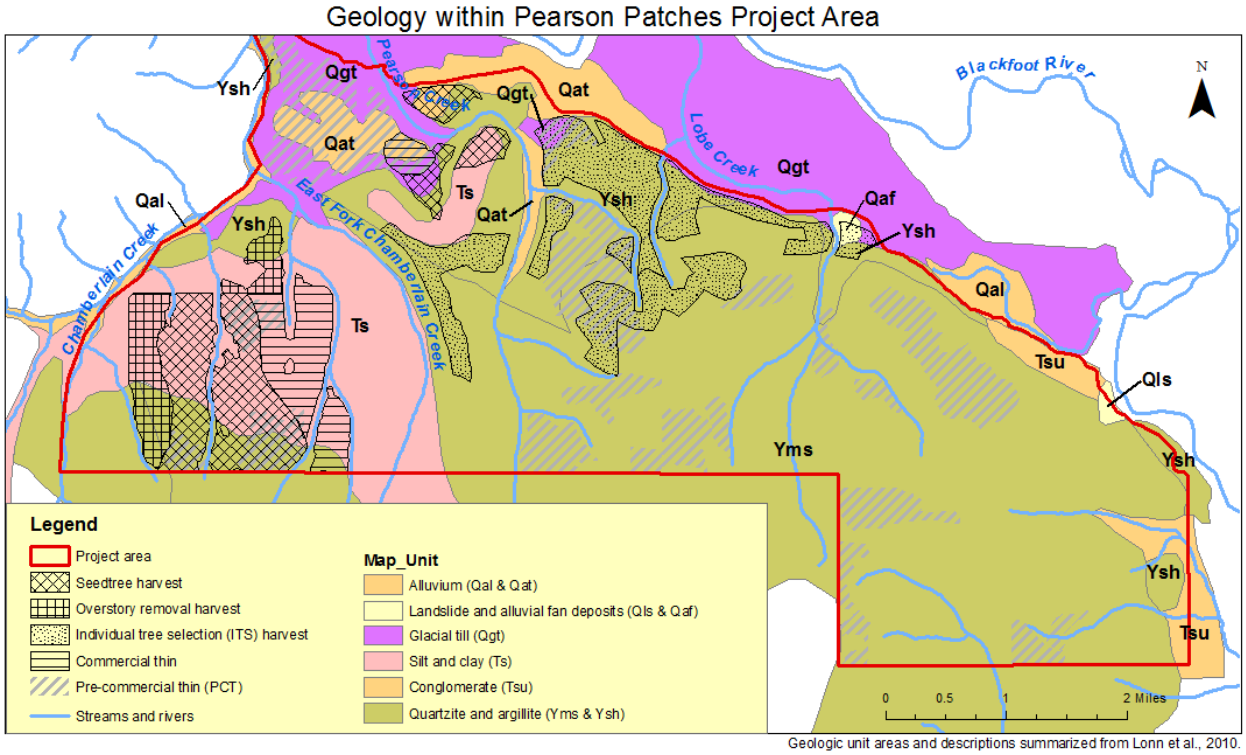
Underlying rock include the Mount Shields and Shepard formations. These Precambrian sedimentary rocks are folded and tilted beds of quartzites and argillites. These sedimentary rock layers are generally dipped to the east and northeast. These rocks are indicated as **Yms** and **Ysh** in Figure S1.

A large portion of the project area is underlain by Tertiary sedimentary rocks composed of relatively soft clay and silt that was deposited in a fluvial or lacustrine environment. These rocks, silts, and clays now exposed along hillslopes in the project and surrounding areas are soft, finely textured, and easily erode. These rocks are indicated as **Ts** in Figure S1.

Glacial till deposits are located mostly north of the proposed harvest areas and adjacent to the Blackfoot River. Glacial tills are indicated as **Qgt** in the geologic map in Figure S1.

Alluvial and landslide deposits occur at the base of some of the draws within the project area and are indicated as **QLs** and **Qaf** in Figure S1. And unsorted Quaternary alluvium including floodplain and stream terrace depsits of gravel, sand, and silt occur at the lowest elevations within the project area; indicated as **Qal** and **Qat** in Figure S1.

Figure S-1: Project area geology summarized from information published by Lonn et al. (2010).



Geologic unit areas and descriptions summarized from Lonn et al., 2010.

Soils

The project area is located in eastern Powell County and project area soils are mapped in the Powell County soil survey (NRCS 2017). A list of the soil map units, descriptions, land types, and existing erosion susceptibility of soils surveyed within the project area are listed in Table S-1. For the purposes of this analysis, minor soils of 5% or less of the area are grouped based on slope, soil properties and interpretations.

Most of the soils in the project area are classified as gravelly loam. However, variability in soil series types across the project area are the consequence of variable parent material, elevations, slopes, and aspects. Higher elevations in the southern portion of the project area have a quartzite and argillite parent material with areas of exposed bedrock and scree; lower elevations and milder slopes in the northern portion of the project area phase from hillslopes to valley terraces and valley floor sediments that are finer, more susceptible to erosion and compaction, and are located in closer proximity to perennial and intermittent streams.
Source material changes from quartzites to fine tills.

Existing disturbances to soils within the direct analysis areas include skid trails evident in historic (1953, 1961, 1972, 1977) and recent (2015) aerial imagery that have reduced conifer regeneration when compared to areas immediately adjacent to these linear features. Past skidding and landing operations observed between historic and current aerial imagery reaches 6% in some of the proposed harvest areas.

Coarse (CWD) woody debris concentrations are assumed to be low when compared with a natural condition in all areas except for Section 16 of 14N 13W, due to extensive historic harvest. Based on CWD concentrations observed by Graham et al (1994) for the DF/PHMA habitat type the natural condition is assumed to be between 4.5 and 9 tons/acre of CWD and fine woody debris.

Table S-1: Soil unit descriptions. Soil units, descriptions, slopes, and erosion factors from soil unit mapping and descriptions provided by the NRCS (2017). Parent material determined from both information provided by Lonn et al. (2010) and the NRCS (2017).

Existing Conditions							Proposed Action			
Map Unit	Description	Direct Effects Analysis Area		Slopes	Parent Material	Whole soil erosion factor (Kw)[1]	Proposed harvest or thinning activity	Erosion Risk[2]	Compaction Risk[3]	Displacement Risk[4]
		Acres	%							
171C	Winfall-Rumblecreek gravelly loams	215	8.9	2 to 8	Qat	0.20	Seedtree, commercial thin, individual selection, and PCT	low	mod	low
171E	Winfall-Rumblecreek gravelly loams	121	5.0	8 to 25	Qgt	0.20	Commercial thin, and PCT	low	mod	low
382E	Elve gravelly loam, warm	203	8.4	15 to 35	Yms	0.15	Individual selection, and PCT	low	mod	mod
382F	Elve gravelly loam, warm	211	8.7	35 to 60	Yms	0.15	Individual selection, and PCT	low	low	high
395E	Rumblecreek gravelly loam	249	10.3	15 to 35	Ts	0.17	Commercial thin, individual selection, and seedtree	low	high	mod
486E	Tevis gravelly loam	339	14.0	15 to 35	Ysh	0.17	Individual selection and PCT	low	mod	low
486F	Tevis gravelly loam	201	8.3	35 to 60	Yms	0.17	Individual selection, and PCT	low	mod	high
999E	Bignell-Rumblecreek complex	276	11.4	15 to 35	Ts	0.17	Seedtree, overstory removal, commercial thin, and PCT	low	high	mod
86F, 95F, 197F, 395F, 786F	Gravelly loam	283	11.7	35 to 60	Ysh and Yms	0.15-0.20	Individual selection, overstory removal, seedtree, and PCT	low	low	high
242E, 299F, 999D, and 999F	Complexes and gravelly loam	126	5.2	8 to 60	Ts	0.10-0.17	Seedtree and overstory removal	low	high	high
71F, 171F, and 197E	Gravelly loams	102	4.2	15 to 50	Ysh and Yms	0.15-0.20	Seedtree, overstory removal, individual selection, and PCT	low	low	mod
86D, 382D, 486D, and 786E	gravelly loams	91	3.8	4 to 35	Yms	0.15-0.17	PCT	low	low	low

[1] Kw values from Powell County soil survey (NRCS 2017) and indicate the erodibility of the whole soil. The estimates provided by the NRCS are modified by the NRCS to account for the presence of rock fragments which, if present, decrease the erodibility of the soil unit.

[2] Erosion risk – Assessed based on soil texture, permeability, parent material, slope, past and current disturbances, proximity to surface waters, and proposed activity and yarding method.

[3] Compaction risk – Assessed based on soil texture, parent material, slope, and proposed activity and yarding method.

[4] Displacement risk – Assessed based on slope and proposed activity and yarding method.

Current and past disturbances (Current site use and site History)

Current and past disturbances in the project area include timber harvest, vegetation management, roads construction and maintenance, and recreational use. Known specifics on these past and current disturbances are listed below.

- The project area (except for Section 16 of 14N 13W) was acquired by the DNRC in July 2010 as part of the Chamberlain Creek purchase from The Nature Conservancy (TNC). The property was purchased by the DNRC with a conservation easement held by the Montana Department of Fish, Wildlife, and Parks (FWP, 2010). Prior to TNC ownership the land was owned by private timber company and managed for forest production. Consequently, the project area and surrounding areas have an extensive forest road system and areas disturbed by previous harvesting activities including historic skid trails and landings. This Chamberlain area was one of the last areas in the region to by harvested with log removal completed with a temporary rail system approximately 70 years ago.
- The CE has several requirements related to road density, location, use, and inventory. These requirements include completing an inventory of roads within the area within the first five years of the CE (i.e., 2015) and subsequently every 10 years. The DNRC inventoried roads in 2015. Also, in 2015, in a project coordinated with FWP and Trout Unlimited, approximately 1.8 miles of open road located adjacent to Chamberlain Creek was reclaimed and another existing open road accessing the Chamberlain watershed was relocated outside of the RMZ. See the Chamberlain Road Inventory Summary in Attachment H for further information on the history and status of road density history and status.
- The only DNRC timber sale in the project vicinity pre-dating the proposed project was "The Stilt" Timber Permit (years 2011-2012). Harvesting operations occurred in areas (approximately 100 acres) north of proposed harvest areas of the project area. The Stilt Timber Permit involved ground-based yarding and the removal of lodgepole pine, and some Douglas-fir and ponderosa pine to improve the overall condition of the overstory, remove mountain pine beetle infested trees, and move the stand toward the desired future condition. No roads were constructed.
- Recreational use of the project area includes hunting, fishing, hiking, and camping. Unpermitted use has included on and off-road vehicle, ATV, and snowmobile travel.
- Noxious weeds occurring within the project and surrounding areas include spotted knapweed, houndstongue, oxeye daisy, leafy spurge, Canada thistle, and St Johnswort.
- No grazing licenses or leases exist or are anticipated in the future for the project area Livestock grazing is prohibited for areas within the CE (see B-14 on page 9 of the CE). Livestock grazing is not prohibited in Section 16 of 14N 13W, which currently has no fencing. Evidence of recent grazing not observed within the project area.
- No recent fire activity.

Environmental Effects

Summary of proposed activities and project design elements that avoid or minimize impacts to water quantity and quality or address impacts associated with the existing condition.

Below is a list of project elements that reduce the potential impacts of the project on water quantity and quality. Some of these project elements can be considered mitigation.

- Applicable state plans, rules, and practices have guided project planning and/or would be implemented during project activities, including the Montana Habitat Conservation Plan (HCP), the Montana Code Annotated (specifically Title 77, Chapter 5), the Administrative Rules of Montana (specifically Rule Chapter 36.11), the Montana Forest Best Management Practices, the Montana Streamside Management Zone (SMZ) Law, the State Forest Land Management Plan, and the Chamberlain Conservation Easement (CE; FWP, 2010)[1].
- The proposed project would meet the management standards identified in the CE.

[1] The CE applies to the project area except for Section 16 of T14N R13W.

No Action Alternative: Direct, Secondary, and Cumulative Effects

No timber harvesting or associated activities would occur under this alternative. Skid trails, roads, and landings from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases. No additional adverse cumulative effects to soils would be expected from the implementation of the No-Action Alternative. Because harvesting would not be implemented, compaction, displacement, and hillslope erosion rates above existing levels would not be expected. Course woody debris levels and nutrient cycling would continue as dictated by natural events.

As is described in the Vegetation Analysis of this EA, noxious weed would persist and may continue to spread even with no action because weeds have been observed to continue to spread over the past decade even though no timber harvest, vegetation management, or livestock grazing have occurred in the project area. Noxious weeds degrade water quality and increase soil erosion compared to sites where native grasses dominate (State Plan, 1999).

Action Alternative: Direct, Secondary, and Cumulative Effects

The project involves timber harvest and pre-commercial thinning (PCT) operations. PCT operations by its nature has no risk to nutrient cycling or soil productivity because this work would not involve the removal of organic material. PCT is also low risk for slope stability, physical disturbance, and erosion because the work would not involve yarding or the operation of wheeled equipment outside of the road prism. Consequently, the discussion of direct, indirect, and cumulative effects of the proposed project on soils is mainly concerning the timber harvest operations, associated yarding and skidding activities, and post-harvest site prep and scarification; and not the proposed PCT operations.

Note that the effects associated with soil erosion on roads, road fill and cut slopes, and landings is analyzed mainly in the Water Resources Analysis section of this EA since the productivity of soils in these areas is less of a concern when compared to sedimentation risk to surface waters.

Geology

Direct, Secondary, and Cumulative

The geology would remain similar to those described in the existing conditions sections of this environmental assessment.

Physical Disturbance (Compaction and Displacement)

Direct and Secondary

The comparison of the soil type map, field reconnaissance, topographic data, and the description of proposed ground-based operations, skidding would occur on slopes within the proposed harvest units indicate that ground-based skidding would occur on slopes up to 45%. Slopes are steeper than 45% in some of the harvest unit areas. Skidding in these steeper areas would be limited to short pitches and would be selected based on strategic skid trail planning that limits soil disturbance, new skid trails, and skidding on slopes greater than 45% (refer to the following Mitigations Section of this analysis).

The extent of the expected direct impacts from skidding would likely be like those reported in the DNRC Soil Monitoring Report (DNRC, 2011) or approximately 12.2 percent for ground-based harvesting. The project proposed to harvest 1,470 acres using ground-based operations, which would be expected to have moderate or higher impacts on up to 179 acres. As is described in the existing conditions of this analysis the lasting effect of past skidding and landing operations observed between historic and current aerial imagery reaches 6% in some of the proposed harvest areas. Where practicable (and where they can meet BMPs), the proposed skidding and landing disturbances associated with this

project would be kept to these areas (refer to the following Mitigations Section of this analysis). This mitigation may reduce the physical disturbance to productive soils in the project area.

Scarification would be used in some harvest areas. Scarification would meet the mitigation criteria in the following section. Scarification would increase the amount of physical disturbance, however these direct effects would not be detrimental if the work is done with clear objectives (i.e., where there is an identified need for mineral soil exposure for germination of desired species), adherence to mitigation, and retention of fine litter and large woody debris at levels also stipulated in the mitigation section.

Table S4 – Direct soil disturbance for the action alternative

Area of analysis		Ground-based yarding disturbance		Scarification disturbance		Maximum total disturbance	
	Total area (acres)	Rate (%)	Affected area (acres)	Rate (%)	Affected area (acres)	Rate (%)	Affected area (acres)
Harvest units (including landings)	1,470	12.2	180	40	590	40	590

Cumulative

Cumulative effects would be controlled by limiting the area of adverse soil impacts to less than 15 percent of the harvest units (as recommended by the State Plan) through implementation of BMPs, skid trail planning, and limiting operations to dry, over snow, or frozen conditions (see Mitigation Section of this analysis). The proposed harvesting activities would rely on the existing road system, skid trails (where appropriate), and landing sites to reduce the area of new direct adverse effects. A larger area, not to exceed 40% (and likely less), would be directly physically disturbed if scarification is deemed necessary for germination of desired tree species (e.g., western larch). This would increase the area of direct effects by physical disturbance, but the risk of moderate or high cumulative impacts would be low with adherence to mitigation listed in the following section.

Erosion

Direct, Secondary, and Cumulative

Hillslope erosion would potentially result from the harvest of trees, yarding, skid trail development, and scarification associated with the project. The magnitude, area, and duration of erosion and other adverse impacts such as compaction and displacement would be lowered by BMPs and mitigations (refer to the following Mitigations Section of this analysis). Therefore, the risk of unacceptable adverse direct, indirect, or cumulative impacts would be low.

Nutrient Cycling and Soil Productivity

Direct, Secondary, and Cumulative

Course woody debris would be left on-site in volumes recommended to help maintain or improve soil moisture and forest productivity over the existing condition. As is described earlier, the existing condition is assessed to have a nutrient cycle that has been disrupted by industrial harvesting for approximately 70 years. The dominant habitat type within the project area (DF/PHMA) would have an optimal CWD concentration of 4.5 to 9 tons per acre (Graham et al., 1994). Tree limbs/tops would be left on site in amounts that are feasible and meet this optimal CWD concentration. It is expected that the concentrations of CWD in the harvest areas would increase with the project over the existing condition. Fine debris removal would be also minimized as much as practicable. Given these measures and the

mitigation described below, the risk of measurable adverse direct, secondary, or cumulative impacts to nutrient cycling would be low.

Slope Stability

Direct, Secondary, and Cumulative

Slopes in the project area are considered stable with low to no vulnerability to mass wasting should the proposed project be implemented. Project design includes road construction and improving road drainage on existing roads which would reduce the risk of slope and fill wasting. Most equipment operations would occur on slopes ≤45%. Therefore, we conclude there would be no risk of direct, secondary, or cumulative effects to slope stability as a result of the proposed project.

Mitigations

Below is a list of additional mitigations that would be included in any implementation of the Action Alternative in order to reduce the potential impacts of the project on soil resources. These mitigations are assumed in this soils resource analysis. Some mitigations are project-specific, and others are general common practice or are commitments made by the DNRC such as the State Plan and the HCP. Additionally, the Forest Officer would continue to meet the management standards identified in the North Chamberlain Conservation Easement (CE).

- To prevent soil compaction ground-based mechanical felling and yarding would be restricted to one or more of the following conditions:
    - Soil moisture content at 4-inch depth less than 20% oven-dry weight.
    - Minimum frost depth of 4 inches.
    - Minimum snow depth of 18 inches of loose snow or 12 inches packed snow.
- For each individual sale the logger and the Forest Officer would agree to a general hauling, landing, and skidding plan prior to equipment operations to meet the following objectives:
    - Limit trails to existing skid trail disturbances as much as possible to minimize new disturbances.
    - Do not use existing skid trails and landings that are within an RMZ.
    - Limit ground-based equipment operations on slopes greater than 45%, except for short pitches.
- Slash would be distributed as much as possible within harvest units. This includes large (≥3-inch diameter) and fine material (such as branches and leafy material).

  The amount of course woody material appropriate to the dominant habitat type within the project area (DF/PHMA) is **4.5 to 9 tons per acre** (Graham et al., 1994). Much of the forest within the harvest units is second or third growth following harvesting over the past century. This has likely resulted in some deficit to the natural nutrient cycling return and in wood debris in the large size class. The project should include a maximization of practicable retention of material within the harvest units within the 4.5 to 9 tons per acre. This can be achieved by any or a combination of the methods listed below:
    - Minimization of the removal of fine branches and leafy material.
    - Cut-to-length harvest systems leaving large and fine debris distributed within harvest units.
    - Return slash to harvest units simultaneously with skidder returns from log landings.
    - Removal and retention of tree tops within harvest units prior to whole tree skidding.
- Skid trails and landings would be treated with slash, water bars, and grass seed to reduce the risk of the concentration and impede overland flow and consequent erosion, to reduce soil detachment by raindrop impact, discourage the recruitment and establishment of weeds on disturbed soils.
- Scarification would be limited to the following conditions:

- Slopes less than 40%
- Cumulative area of direct disturbance, when combined with ground-based yarding disturbances, would not exceed 40%.
- Where there is an identified need for mineral soil exposure for germination of desired species (such as western larch).
- Scarification depths not to exceed those necessary to achieve exposure of mineral soil and not more.

References

Ecological Solutions Group LLC (ESG) and Montana Fish Wildlife and Parks (FWP), 2009, Chamberlain Creek Conservation Easement Baseline Inventory. 71p.

DNRC, 1996. State Forest Land Management Plan. Department of Natural Resources and Conservation, Forest Management Bureau. Missoula, MT. 1996.

DNRC, 2011. DNRC compiled soils monitoring report on timber harvest projects, 2006-2010, 1st Edition. Department of Natural Resources and Conservation, Forest Management Bureau, Missoula, MT.

Graham, R.T., Harvey, A.E., Jurgensen, M.F., Jain, T.B., Tonn, J.R., and Page-Dumroese, D.S., 1994, Managing Coarse Woody Debris in Forests of the Rocky Mountains. U.S. Forest Service Research Paper INT-RP-477. Intermountain Research Station.16 p.

Harmon, M.E.; Franklin, J.F., and F.J. Swanson, 1986. Ecology of coarse woody debris in temperate ecosystems. Advances in Ecological Research, Vol.15. New York: Academic Press: 133-302.

Lonn, J.D., McDonald, C., Sears, J.W., and Smith, L.N., 2010, Geologic Map of the Missoula East 30' x 60' Quadrangle, Western Montana. Montana Bureau of Mines and Geology Open File MBMG 593, Plates 1 and 2.

NRCS, 2017, Soil Survey of the Powell County Area, Montana. Version 14, September 21, 2017.

Attachment E-Water Resources Analysis

Analysis Prepared By:
Name: Andrea Stanley
Title: Hydrologist/Soils Scientist, Montana DNRC

Introduction

The following analysis will disclose anticipated effects to water resources within Pearson Patches project area. Direct, secondary, and cumulative effects to water resources of both the No-Action and Action alternatives are analyzed.

Issues and Measurement Criteria

Timber harvest, site preparation, road construction/maintenance, and vegetation management can alter local water quality and quantity. Water resource issues include the following:

- Quality
- Quantity

Evaluating for the above issues will address issues raised during project scoping and will also include accounting for commitments associated with the North Chamberlain Conservation Easement (CE; FWP, 2010). Compliance with the regulatory framework listed in the following section is also assumed and accounted for in this analysis. Water resource related comments received during scoping were limited to comment from the Montana Fish Wildlife and Parks, which consisted of reference to the existing CE (1/11/18).

Regulatory Framework

The following plans, rules, and practices have guided project planning and/or would be implemented during project activities:

- The North Chamberlain Conservation Easement (CE; FWP, 2010) which includes Standards for Forest Management (2010)
- The Montana Department of Natural Resources and Conservation (DNRC) Forested Trust Lands Habitat Conservation Plan (HCP; USFWS and DNRC 2010)
- The Montana Code Annotated, specifically Title 77, Chapter 5.
- The Administrative Rules of Montana, specifically Rule Chapter 36.11
- The Montana Forestry Best Management Practices (Voluntary, but considered as management requirement for State Lands)
- The Montana Streamside Management Zone Law
- The State Forest Land Management Plan (DNRC, 1996)
- The Stream Protection Act (SPA)

Analysis Areas

The Pearson Patches project area spans two watershed boundaries and is contained within the sub-watersheds listed below. Figure W-1 shows the analysis areas.

Sub-watershed (6th level)	12-digit Hydrologic Unit Code	Analysis Area Description

Chamberlain Creek	170102030907	The analysis area is the drainage area of the HUC, which is 14,360 acres. Watershed is tributary to the Blackfoot River.
Blackfoot River-Lahrity Lake	170102030910	The analysis area is reduced from the HUC to include only the area south of the mainstem of the Blackfoot River. This analysis area is 9,550 acres. This analysis area is tributary to the Blackfoot River.
Blackfoot River-Lower Warren Creek	170102030905	The analysis area is reduced from the HUC to include only the area south and west of the mainstem of the Blackfoot River. This analysis area is 8,720 acres. This analysis area is tributary to the Blackfoot River.

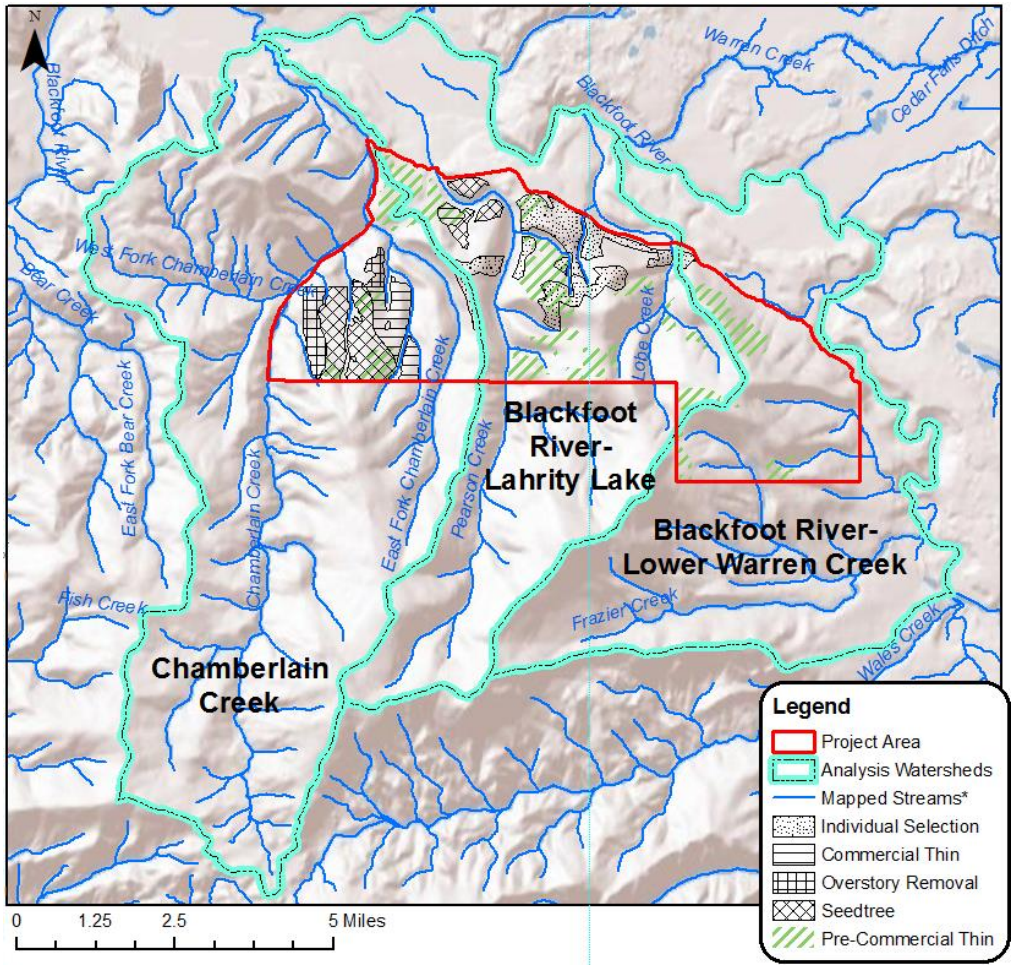


Figure W-1: Water resources analysis areas, mapped streams, and proposed vegetation harvest and treatment areas. (Mapped streams include field-verified and unverified locations.)

Analysis Methods

This assessment begins with a characterization and evaluation of the **existing conditions** within the assessment areas. This informs both potential site sensitivities to water quality and quantity impacts (e.g., listed beneficial uses) and the likely condition that would persist under the No Action Alternative. Below is a list of the data and analysis methods used for characterizing existing conditions:

- Total Maximum Daily Load (TMDL) documents and Watershed Restoration Plan(s) including the following:

- Middle Blackfoot-Nevada TMDL and Water Quality Improvement Plan: Sediment, Nutrients, Trace Metal and Temperature TMDLs (DEQ, 2008).
- Final Middle Blackfoot-Nevada TMDL and Water Quality Improvement Plan Addendum (DEQ, 2014).

- Past and current DRNC land and forest management data
- DNRC grazing license data and monitoring
- On-site observations including road infrastructure BMP monitoring, stream channel conditions, observations on geology, soils, slopes, historic road and skid trails, and streamside and wetland vegetation.

To evaluate the **potential water resource effects of the Action and No Action Alternatives** within the assessment areas we consider impacts typical to timber harvest, associated infrastructure and activities including roads, landings, vegetation/fuels management including slash treatment, and weed management.

Existing Conditions

Below is a summary of key water resource related site conditions and findings for the project area:

- All streams within, downgradient, and downstream of the project area are classified as B-1 streams.
- As recently as 2009, cattle grazing had been identified as a major cause of water quality and stream degradation in the area (ESG and FWP, 2009). However, since 2009, cattle grazing has been excluded from state-owned lands within the project area.
- An extensive road and landing network exist within the project area, mostly associated with industrial timber ownership until 2009.
- Roads and stream crossings within the project area and along state-owned haul routes vary in age, condition, and compliance with BMP standards.

Below is a summary of the named surface waters within, downgradient, or downstream of the project area. Figure W-1 shows the analysis areas and identified streams within the project area.

Chamberlain Creek is a second order tributary to the Blackfoot River and classified as a B-1 stream (Water Quality Category 1) in the Middle Blackfoot TMDL Planning Area. The creek was formerly listed as impaired by flow alterations, habitat alterations, and suspended solids. Sediment sources included channel diversions, riparian grazing damage, and road sediment. Following restoration work completed in the 1990s, the creek was determined to be fully supporting all beneficial uses and has maintained use support since 2000 (DEQ, 2008).

Historically the creek, the creek's channel migration zone, and the creek's floodplain were impacted significantly by industrial logging including the installation of a rail grade and landing(s) for industrial logging in the 1940's. This information is known anecdotally and verified with historical photographs (Mansfield Library, accessed 2019).

Several fish species including Bull Trout and Westslope Cutthroat Trout occur within Chamberlain Creek and its east fork tributary. See the Fisheries Analysis of this EA for further discussion and analysis on fisheries resources.

Pearson Creek is tributary to Chamberlain Creek. The creek had formerly been completely diverted and was reconnected to Chamberlain Creek with the donation of instream flows in the 1990s. This reconnection equates to the addition of 1 cfs to base flow and about 8 cfs during peak flows.

Several fish species including Westslope Cutthroat Trout and Brook Trout occur within Pearson Creek. See the Fisheries Analysis of this EA for further discussion and analysis on fisheries resources.

Lobe Creek rarely has a surface connection with downgradient water bodies. Topographically, the creek contributes to the Blackfoot River, however a channel connection could not be identified north of the project area. The creek flows perennially within the project area. These perennial flows go subsurface when the Creek's valley opens into an alluvial fan at the mouth of the Lobe Creek draw near the northern edge of the project area.

Frazier Creek is a second order tributary to the Blackfoot River and classified as a B-1 stream (Water Quality Category 4A) in the Middle Blackfoot TMDL Planning Area. The creek is listed as impaired due to alteration of streamside or littoral vegetative covers, low flow alterations, sedimentation/siltation, TKN, and TP. The sources of these impairments include grazing in riparian zones, water diversions, irrigated crop production, and hydrostructure impacts to fish passage.

Blackfoot River is a large tributary to the Clark fork River and is classified as a B-1 stream (water quality category 4A) in the Middle Blackfoot TMDL Planning Area. The river has been assessed for water quality impairments at the reach-scale with two reaches downstream of the project area divided as upstream and downstream of the Monture Creek confluence. Both reaches are listed as impaired due to total nitrogen, total phosphorous, sedimentation-siltation, and temperature. These impairments result in not fully supporting aquatic life.

Current and past disturbances (Current site use and site History)

Current and past disturbances in the project area include timber harvest, vegetation management, roads construction and maintenance, and recreational use. Known specifics on these past and current disturbances are listed below.

- The project area (except for Section 16 of 14N 13W) was acquired by the DNRC in July 2010 as part of the Chamberlain Creek purchase from The Nature Conservancy (TNC). The property was purchased by the DNRC with a conservation easement held by the Montana Department of Fish, Wildlife, and Parks (FWP, 2010). Prior to TNC ownership the land was owned by private timber company and managed for forest production. Consequently, the project area and surrounding areas have an extensive forest road system and areas disturbed by previous harvesting activities including historic skid trails and landings. This Chamberlain area was one of the last areas in the region to by harvested with log removal completed with a temporary rail system approximately 70 years ago (see Figure W-2).
- The CE has several requirements related to road density, location, use, and inventory. These requirements include completing an inventory of roads within the area within the first five years of the CE (i.e., 2015) and subsequently every 10 years. The DNRC inventoried roads in 2015. Also, in 2015, in a project coordinated with FWP and Trout Unlimited, approximately 1.8 miles of open road located adjacent to Chamberlain Creek was reclaimed and another existing open road accessing the Chamberlain watershed was relocated outside of the RMZ. See the Chamberlain Road Inventory Summary in Attachment H for further information on the history and status of road density history and status.
- The only DNRC timber sale in the project vicinity pre-dating the proposed project was “The Stilt” Timber Permit (years 2011-2012). Harvesting operations occurred in areas (approximately 100 acres) north of proposed harvest areas of the project area. The Stilt Timber Permit involved ground-based yarding and the removal of lodgepole pine, and some Douglas-fir and ponderosa pine to improve the overall condition of the overstory, remove mountain pine beetle infested trees, and move the stand toward the desired future condition. No roads were constructed.
- Recreational use of the project area includes hunting, fishing, hiking, and camping. Unpermitted use has included on and off-road vehicle, ATV, and snowmobile travel.
- Noxious weeds occurring within the project and surrounding areas include spotted knapweed, houndstongue, oxeye daisy, leafy spurge, Canada thistle, and St Johnswort.
- No grazing licenses or leases exist or are anticipated in the future for the project area Livestock grazing is prohibited for areas within the CE (see B-14 on page 9 of the CE). Livestock grazing is not prohibited in Section 16 of 14N 13W, which currently has no fencing. Evidence of recent grazing not observed within the project area.
- No recent fire activity.

Figure W-2: Tractor yarding logs to train landing in the Chamberlain Creek area on July 29, 1948. Photo source University of Montana accessed 2019 (https://mtmemory.org/digital/collection/p16013coll27/id/1355/rec/1). Photo original from the Anaconda Forest Products Company Records.

Environmental Effects

Summary of proposed activities and project design elements that avoid or minimize impacts to water quantity and quality or address impacts associated with the existing condition.

Below is a list of project elements that reduce the potential impacts of the project on water quantity and quality. Some of these project elements can be considered mitigation.

- Applicable state plans, rules, and practices have guided project planning and/or would be implemented during project activities, including the Montana Habitat Conservation Plan (HCP), the Montana Code Annotated (specifically Title 77, Chapter 5), the Administrative Rules of Montana (specifically Rule Chapter 36.11), the Montana Forest Best Management Practices, the Montana Streamside Management Zone (SMZ) Law, the State Forest Land Management Plan, and the Chamberlain Conservation Easement (CE; FWP, 2010)[2].

- Harvest boundaries rarely cross streams within the project area. Commercial harvest activities conducted near streams within most of the project area would comply with CE commitments (except for Section 16 of T14N R13W) and the HCP. The HCP applies to the entire project area and in general has similar restrictions to the CE.

- Soil protection and mitigation measures listed in the soils analysis of this EA also protect water quality by avoiding and minimizing sedimentation risk. This includes, but not limited to road drainage BMPs, CWD retention, and grass-seeding of disturbed areas such as skid trails, landings, and road prisms.

- The Forest Officer or DNRC Hydrologist would routinely inspect road closures, such as gates, barriers, and earth berms routinely during project implementation (per CE Standards for Forest Management page 4).

- As part of the project some roads on or adjacent to the planned commercial harvest haul route that are identified as not needed for future activities would be abandoned or reclaimed. Some of these roads have already been identified as abandoned or reclaimed but these closures to motorized use have not been effective or require maintenance to continue to be effective. Therefore, the proposed project would include abandonment or reclamation work to a level that the road meets the definitions identified in the CE. These definitions are repeated below. Proposed road abandonment or reclamation would contribute to the maintenance or reduction of open and total road density commitment within the CE. See the Chamberlain Road Inventory Summary in Attachment H for further information on the history and status of road density history and status. A portion of road abandonment (or reclamation) equal to the proposed restricted road construction length (0.7 miles) associated with this project would be mitigation for the proposed road construction. Other potential road abandonment (or reclamation) work would be addressing the existing condition and is not mitigation for the proposed project, but nevertheless would reduce the risk of cumulative effects of proposed road construction.

  Abandoned Road – Impassible to motorized vehicles due to effective closure but has drainage features that ***have not*** been removed.
  Reclaimed Road – Impassible to motorized vehicles due to effective closure. It has been stabilized and **culverts and other drainage structures if present *have been removed***, but the road prism may remain. Reclaimed roads would be re-vegetated (including soil preparation where necessary) with native

[2] The CE applies to the project area except for Section 16 of T14N R13W.

vegetation consistent with the site, and made impassible to motorized vehicles through means such as ripping of road prisms, placement of root wads, boulders, slash/debris, and reforestation, etc.

No Action Alternative: Direct, Secondary, and Cumulative Effects

Water Quality

Direct and Secondary

Under this alternative, no timber harvesting, or related activities would occur. Water Quality would continue as described in the existing conditions.

Cumulative

No additional cumulative impacts to water quality would be expected. Sediment delivery sites from roads on the proposed haul routes would remain unchanged, as would the sediment sources described in Existing Conditions.

Water Quantity

Direct and Secondary

No increased risk of increases or reductions in annual water yield would result from this alternative.

Cumulative

No increase in water yield would be associated with this alternative. As vegetation continues toward a fully forested condition, annual water yields would also be expected to gradually decline.

Action Alternative: Direct, Secondary, and Cumulative Effects

Water Quality

Direct and Secondary

With implementation of all applicable BMPs and CE requirements the risk of direct or secondary water quality impacts would be low. Water quality is expected to continue as described in the existing conditions.

Cumulative

The cumulative effects of the project on water quality within and downstream of the project are expected to be undetectable.

Water Quantity

Direct and Secondary

Local evapotranspiration and precipitation interception rates would decrease in the short term with the removal and thinning of vegetation associated with the timber harvest and pre-commercial thinning. However, the increased water availability is expected to increase growth of remaining trees in the thinned areas and the establishment of new trees following the harvest are expected to gradually increase water consumption with growth.

Studies correlating vegetation harvest and treatment with streamflow yield have suggested approximately 15-20% of the watershed cover must be harvested to have a measurable increase in water yield in similar mountain environments (Stednick, 1996; and Bosch and Hewlett, 1982). Below is a summary of estimated percent vegetation removal by treatment type proposed with this project.

Cutting treatment type	Treatment	Percent Vegetation Removed*

Even-aged Regeneration	Seed Tree	90%
	Overstory Removal	30%
Intermediate	Commercial Thinning	50%
	Pre-Commercial Thinning	75%
Uneven-aged Regeneration	Individual Tree Selection	75%

*****Percent vegetation removed from within the treatment acres estimated from projected basal area that would be cut or estimated canopy cover that would be removed. These numbers are intended to be conservative; that is, the maximum potential removal is reported here, but the percent vegetation removal may be less.

The total anticipated vegetation within any watershed area contributing to a stream is not anticipated to exceed 15% (see Table W-1 for analysis results) and therefore has a low risk of producing excess runoff or cause a measurable change in stream flows.

Table W-1 – Estimated vegetation removal by watershed for the action alternative

Watershed	Feature	Percent vegetation removed above feature	Percent vegetation removed from watershed
Chamberlain Creek	Chamberlain Creek above East Fork Chamberlain Creek confluence	3%	4%
	East Fork Chamberlain Creek	10%	
Blackfoot River – Lahrity Lake	Pearson Creek	11%	9%
	Lobe Creek	15%	
Blackfoot River – Lower Warren Creek	Frazier Creek	2%	3%

Cumulative

The cumulative effects of the proposed project would be less than the anticipated local direct and secondary effects and would therefore be low risk and expected to not be detectable.

Mitigations

Below is a list of additional mitigations that would be included in any implementation of the Action Alternative in order to reduce the potential impacts of the project on water resources.

- Drainage improvement and maintenance work would be completed on existing roads within state lands and on the haul route between the project area and the nearest county road. The Project Manager would complete a road log for location and design of drainage improvements on existing roads and for the installation of the proposed new roads.

References

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Stednick, J.D. 1996. Monitoring the effects of timber harvest on annual water yield. J. Hydrology 176:79-95.

Attachment F-Fisheries Resources Analysis

Assessment Prepared By:

Name: Mike Anderson

Title: Fisheries Biologist, Montana DNRC

Introduction

The following assessment will disclose anticipated effects to fisheries resources within the Pearson Patches Timber Sale project area.

Issues

For the purposes of this environmental assessment, issues will be considered actual or perceived effects, risks, or hazards as a result of the proposed alternatives. Issues, in respect to this environmental assessment, are not specifically defined by either the Montana Environmental Policy Act or the Council on Environmental Quality.

The following issue statements were developed based on internal scoping and public comments received during the scoping period:

Fisheries Connectivity: Restrictions to fisheries connectivity were identified in Pearson Creek, and East Fork Chamberlain Creek with four existing crossing structures preventing upstream movement by all life stages of westslope cutthroat trout.

Analysis Areas

Three fisheries analysis areas were identified to evaluate existing conditions and potential impacts to fisheries and fisheries habitat resources associated with the proposed actions. Analysis areas include the Chamberlain Creek (HUC12: 170102030906), Blackfoot River-Lahrity Lake (HUC12: 170102030907), and Blackfoot River-Lower Warren (170102030905) watersheds (Map W-1). Analysis areas were selected based on current and historic fish communities, and potential effects of the proposed actions including timber harvest, road construction, and haul routes which have measurable or detectable impacts to fisheries populations or habitat resources in those areas.

Analysis Areas dismissed from further analysis

The Blackfoot-Lower Warren Analysis Area (170102030905) includes 8,721 acres in the Blackfoot River watershed. Proposed activities in this analysis area include approximately 16 acres of commercial timber harvest (0.1% of the analysis area), all of which is at least 3,000 feet away from any fish-bearing waterbodies. Other forest management activities proposed in the analysis area include 234 acres of pre-commercial thinning (PCT) in regenerating timber stands (2.7% of the analysis area). Proposed PCT units are greater than 500 feet from the nearest fish-bearing stream, and access to the proposed units will be along established restricted access roads in the analysis area. No road-stream crossings will be constructed in the analysis area, and one perennial stream crossing would be utilized to access PCT units. Based on the minimal amount commercial timber harvest, lack of new road construction, no construction of road-stream crossings, and no timber management activities within 500 feet of a fish-bearing stream, the proposed action is not expected to have measurable or detectable direct, indirect, or cumulative impacts to fisheries resources in this analysis area.

Assessment Methods

Existing Conditions will be described for each analysis area included under the proposed action. *Environmental Effects* will compare the existing conditions to the anticipated effects of the No-Action Alternative and the Action Alternative to evaluate potential impacts to fisheries resources in the project area. The environmental analysis will focus primarily on fisheries populations and habitat variables affecting bull trout (*Salvelinus confluentus*) and westslope cutthroat trout (*Oncorhynchus clarkii lewisii*), as these native species are the primary focus of conservation actions and related comments received during project scoping (internal and external). Additional species present or presumed to be present in the project area are not listed under federal or state programs. Potential effects mechanisms that could impact other

native and non-native fish species present in the project area can be adequately addressed through analysis on the focal species. Analyses may be either qualitative or quantitative and will utilize the best available data for both fisheries populations and habitat resources.
The following variables will be used to evaluate potential environmental effects to fisheries resources in the project area.

- Fisheries Populations – Presence/Absence, Genetic Purity
- Fisheries Populations – Connectivity
- Fisheries Habitat – Channel Forms
    - Fisheries Habitat – Sediment
    - Fisheries Habitat – Flow Regimes
    - Fisheries Habitat – Woody Debris
- Fisheries Habitat – Stream Temperature
    - Fisheries Habitat – Stream Shading
- Fisheries Habitat – Cumulative Effects

Direct effects to fisheries populations are defined as those that would alter or impact species presence/absence or genetic purity. Indirect impacts on fisheries populations may include alterations to population connectivity through the addition or improvement of road-stream crossing structures.
The descriptions of foreseeable adverse impacts to fisheries resources are described in Table-F1. Positive impacts to fisheries resources will also be described, if applicable, using information on impact extent and duration.
Cumulative impacts are those collective impacts on the human environment of the proposed action when considered in conjunction with other past, present, and future actions related to the proposed action by location or generic type (75-1-220, MCA). The potential cumulative impacts to fisheries resources in the analysis areas are determined by assessing the collective anticipated direct and indirect impacts, other related existing actions, and future actions affecting the fisheries resources.

Table F1 – Descriptions of foreseeable adverse impacts.

Impact Description	Probability of Impact	Severity of Impact	Duration of Impact
Negligible	The resource impact is not expected to be detectable or measureable	The impact is not expected to be detrimental to the resource	Not applicable
Low	The resource impact is expected to be detectable or measureable	The impact is not expected to be detrimental to the resource	Short- or long-term
Moderate	The resource impact is expected to be detectable or measureable	The impact is expected to be moderately detrimental to the resource	Short- or long-term
High	The resource impact is expected to be detectable or measureable	The impact is expected to be highly detrimental to the resource	Short- or long-term

Relevant Agreements, Laws, Plans, Rules, and Regulations

The US Fish and Wildlife Service has listed bull trout as threatened under the Endangered Species Act (USFWS 1999, 2015a, 2015b). Both bull trout and westslope cutthroat trout are listed as S2 Montana Animal Species of Concern. Species classified as S2 are considered to be at risk due to very limited and/or potentially declining population numbers, range, and/or habitat, making the species vulnerable to global extinction or extirpation in the state (Montana Fish,

Wildlife and Parks, Montana Natural Heritage Program, and Montana Chapter American Fisheries Society Rankings). DNRC has also identified bull trout and westslope cutthroat trout as sensitive species (ARM 36.11.436).
DNRC is a cooperator and signatory to the following relevant agreements: Restoration Plan for Bull Trout in the Clark Fork River Basin and the Kootenai River Basin, Montana (2000), Memorandum of Understanding (2005) for the and Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana (2007). All 3 agreements contain land management conservation strategies or action items utilized by DNRC as decision-making tools.
Fisheries-specific forest management ARMs (36.11.425 and 36.11.427), the SMZ Law and rules, and other site-specific prescriptions would be implemented as part of any action alternative.
All waterbodies contained in the fisheries analysis areas are classified as B-1 in the Montana Surface Water Quality Standards (ARM 17.30.608[b][i]). B-1 classification is for multiple beneficial-use waters, including the growth and propagation of cold-water fisheries and associated aquatic life. Among other criteria for B-1 waters, a 1-degree Fahrenheit maximum increase above naturally occurring water temperature is allowed within the range of 32 to 66 degrees Fahrenheit (0 to 18.9 degrees Celsius), and no increases are allowed above naturally occurring concentrations of sediment or suspended sediment that will harm or prove detrimental to fish or wildlife. Regarding sediment, naturally occurring includes conditions or materials present from runoff or percolation from developed land where all reasonable land, soil, and water conservation practices have been applied (ARM 17.30.603[19]). Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses (ARM 17.30.603[24]). The State has adopted BMPs through its Nonpoint Source Management Plan as the principle means of controlling nonpoint source pollution from silvicultural activities.

Existing Conditions

Fisheries Populations

Fisheries populations in both the Chamberlain Creek and Blackfoot River-Lahrity Lake analysis areas are comprised of both native and non-native species (Table F-2). Competition, predation, displacement, and hybridization have been shown to have direct and indirect negative effects on both bull trout and westslope cutthroat trout (Leary et al. 1993, Kanda et al. 2002, Rieman et al. 2006, Al-Chokhachy et al. 2016). Genetic samples collected in Chamberlain Creek in 1989 and 1998 observed introgression between westslope cutthroat and rainbow (*O. mykiss*) trout, reducing genetic purity in the westslope cutthroat population to 98%. Westslope cutthroat trout are the only species known to be present in East Fork Chamberlain Creek, with no reported genetic surveys completed in the watershed. Genetic samples collected in Pearson Creek in 1994 indicated introgression between westslope cutthroat and rainbow trout, reducing cutthroat purity to 98% (MFISH 2019).
Based on the presence of non-native species and resulting impacts on native species including reduced genetic purity, increased competition for food and habitat resources, and predation, there is an existing moderate impact on fisheries populations and genetics in the Chamberlain Creek Analysis Area, and a high existing impact on fisheries populations and genetics in the Pearson Creek Analysis Area.

Chamberlain Creek Analysis Area

The Chamberlain Creek watershed encompasses an area of 14,338 acres in the Blackfoot River watershed, of which 478 acres (3.3% watershed area) are within 120 feet of a Class 1 stream. The analysis area includes Chamberlain Creek and East Fork Chamberlain Creek sub-watersheds, including river miles 0.0-10.7 on Chamberlain Creek, 0.0-7.9 on East Fork Chamberlain Creek, and several perennial and intermittent tributaries. Specific reaches of stream within the project area include river miles 1.9-4.9 adjacent to Chamberlain Creek, and river miles 0.0-2.5 adjacent to East Fork Chamberlain Creek (Figure W-1).
Connectivity in Chamberlain Creek is not limited by existing road-stream crossings, with a single crossing structure present near RM 3.9. Four perennial road-stream crossings are present in the East Fork of Chamberlain Creek, including one bridge, two CMPs, and one failed native log crossing structure. The CMPs do not provide full levels of fish passage, and the failed native log crossing may limit fish passage seasonally during periods of low streamflow. Based on the existing fish passage barriers there is a high existing impact to fisheries connectivity in the analysis area.
Potential sediment sources in the analysis area include road-stream crossings and existing forest roads within 300 feet of perennial and intermittent streams. Current road infrastructure in the analysis area is identified in Table F-3. Based on

the existing roads within 300 feet and road-stream crossings on perennial or intermittent streams, there is a low existing impact to sediment in the analysis area.
Fisheries habitat in the Chamberlain Creek analysis area is defined spatially through the frequency and volume of slow and fast water habitats and thermally through seasonal and diel variability in the stream temperature regime. Qualitative field reviews of Chamberlain and East Fork Chamberlain found habitat conditions to be stable, with little evidence of recent scour events and stable streambanks. Average stream gradient in Chamberlain Creek is 2.2% adjacent to the project area, with slightly higher gradient observed in East Fork Chamberlain Creek of 5.4%. Stream temperature monitoring conducted in 2017–2018 indicated that thermal conditions in the analysis area are within the range to support all life stages of native fish (Figure F-1). Historic riparian timber harvest has occurred along fish-bearing streams and may have impacted historic spatial and thermal components of fish habitat in the analysis area, however the range of conditions among the variables described above are likely within the range of naturally occurring conditions. Based on the conditions described for existing fisheries habitat, there is a low existing impact on channel form, stream temperature, and stream shading in the Chamberlain Creek analysis area.
Existing impacts to fisheries resources in this analysis area include the adverse impacts of non-native fish species, existing forest roads within 300 feet perennial or intermittent streams, numerous improved and unimproved road-stream crossings that may elevate sedimentation with periodic use and limit habitat connectivity in East Fork Chamberlain Creek, and historic riparian timber harvest and livestock grazing. Due to current and historic land use, annual water yield is likely elevated compared to fully forested and ungrazed conditions. Based on these conditions and subsequent direct and indirect impacts, a high existing cumulative effect to fisheries resources likely occurs in this analysis area.

Blackfoot River-Lahrity Lake Analysis Area

The Blackfoot River-Lahrity Lake Analysis Area encompasses an area of 9,551 acres in the Blackfoot River watershed, of which 178 acres (1.9% watershed area) are within 120 feet of a Class 1 stream. The analysis area includes river miles 0.0-4.2 on Pearson Creek, with specific reaches of stream adjacent to proposed timber management from river miles 1.4-4.1 adjacent to Pearson Creek (Figure W-1). Assessment of these resources will be both quantitative and qualitative.
Four perennial road-stream crossings are present in the analysis area, all of which are on Pearson Creek. Currently two bridge crossings in the lower reach of stream provide full fish passage, while a CMP in the middle portion of the watershed limits passage of all life stages of fish in Pearson Creek. The fourth structure is a native log bridge, with decking removed and abutments still present in the floodplain but does not impact fish passage. Based on the existing fish passage barrier there is a high existing impact to fisheries connectivity in the analysis area.
Potential sediment sources in the analysis area include road-stream crossings and existing forest roads within 300 feet of perennial and intermittent streams. Current road infrastructure in the analysis area is identified in Table F-3. Based on the existing roads within 300 feet and road-stream crossings on perennial or intermittent streams, there is a moderate existing impact to sediment in the analysis area.
Channel forms comprise the primary spatial component of fisheries habitat and include the frequency and volume of different slow and fast water features. Stream temperature is the primary thermal component of fisheries habitat and typically includes watershed-specific seasonal and daily fluctuations. Qualitative field reviews of Pearson Creek found stream habitat conditions to be stable, with little evidence of recent scour events and stable streambanks. Average stream gradient in the project area is 3.3%. Stream temperature monitoring was not conducted in Pearson Creek; however, thermal conditions appear to be fully supportive of aquatic life, with multiple size classes of salmonids observed during field surveys.
Based on existing channel conditions and conditions of the riparian community, there is a low existing impact on channel form, stream temperature and large woody debris in the analysis area.
Existing impacts to fisheries resources in this analysis area include the adverse impacts of non-native fish species, existing forest roads within 300 feet perennial or intermittent streams, numerous improved and unimproved road-stream crossings that may elevate sedimentation with periodic use and limit habitat connectivity in Pearson Creek, and historic riparian timber harvest. Due to current and historic land use, annual water yield is likely elevated compared to fully forested and ungrazed conditions. Based on these conditions and subsequent direct and indirect impacts, a high existing cumulative effect to fisheries resources likely occurs in this analysis area.

Environmental Effects

The environmental effects section will compare the existing conditions to the anticipated effects of the proposed No-Action and Action Alternatives to determine the foreseeable impacts to associated fisheries resources. Proposed actions in this analysis area that may affect fisheries resources include; 1) upland timber harvest, 2) forest road maintenance and construction, 3) road-stream crossing use, maintenance and improvements, and 4) forest road utilization for timber hauling and equipment transportation. Fisheries resource variables potentially affected by the proposed actions are populations, connectivity, channel form, sediment, and flow regime. No impact to stream temperature, stream shading, or large woody debris are anticipated as a result of implementation of the action alternative.

All Analysis Areas

No Action Alternative: Direct, Indirect, and Cumulative Effects

As a result of implementing the No-Action Alternative, no additional direct or indirect effects to fisheries resources would be expected to occur within the assessment area beyond those described in the Existing Conditions.
Future actions considered under cumulative effects will continue to occur including effects of non-native fish species on native species, fish connectivity limitations, forest management practices on adjacent private or federal lands, and various recreational uses. Open public roads in the analysis areas will continued to be utilized for forest management and recreational activities. Anticipated future actions are expected to be low to moderate risks to sediment and channel forms. In summary, cumulative effects of the No-Action Alternative are expected to be similar to those described in Existing Conditions.
The proposed actions and affected fisheries resources in all analysis areas are broadly described in the Pearson Patches EA, Project Development (Proposed Action Alternative). Project-specific BMPs and road maintenance would be applied to all segments of the haul routes through the assessment area (see Water Resources analysis). All impact descriptions are short-term unless otherwise noted.

Chamberlain Creek Analysis Area

Action Alternative: Direct, Indirect, and Cumulative Effects

Proposed actions potentially affecting fisheries resources in the Chamberlain Creek Analysis Area include;

- Use, maintenance, and/or construction of main and secondary haul routes for timber and equipment transportation
- Construction and/or maintenance of road-stream crossings on perennial and intermittent streams
- Road construction and/or maintenance of new and existing roads within 300 feet of perennial or intermittent streams
- Upland timber harvest

No direct or indirect effects to fisheries populations (presence/absence, genetic purity) are expected to occur in this analysis area under the proposed action alternative. The bull trout population in Chamberlain Creek will continue to exist in sympatry with brook (*S. fontinalis*) and brown (*Salmo trutta*) trout, resulting in continued hybridization risk with brook trout and potential displacement by both species. Adverse impacts of non-native species will continue to occur at the same levels as described under the *Existing Environment*. The existing barriers to fish movement in East Fork Chamberlain will not be addressed during this timber sale, resulting in a continued high impact on connectivity in the analysis area. The crossing structures are covered under the HCP Fish Connectivity Conservation Strategy and will be subject to commitments made under the HCP to provide full levels of fish passage by 2042.
Within the analysis area, increased truck traffic will occur as a result of timber hauling and equipment transportation. This increase may accelerate mobilization and erosion of road surface material at road-stream crossings (Reid and Dunne 1984, Bilby et al. 1989, Coker et al. 1993, Luce and Black 2001). Nine total perennial stream crossings are present in the analysis area, of which, five crossings will be used to haul timber and equipment into and out of the project area. Several of the structures do not currently meet BMPs and will be addressed during the timber sale. Sediment delivery

risks at these crossing sites range from low to high, based on the likelihood and magnitude of potential sediment delivery. Four intermittent stream crossings will be utilized during the project, none of which currently meet BMPs and have sediment risk ratings of low to moderate. Implementation of BMPs will mitigate potential sediment delivery on both perennial and intermittent crossings and reduce sediment risk across the analysis area. Additionally, improvement of several existing road-stream crossings in the analysis area is expected to reduce sediment inputs considerably at these locations (Sugden 2018). New road construction is limited to a 300-foot segment of new road which will eliminate a segment of stream adjacent road. As a result of implementation of BMPs, there is an anticipated low risk of low impacts to sediment in the analysis area, an improvement over the existing condition.

As described in Attachment E (Water Resources Analysis), the levels of proposed timber harvest are not expected to lead to measurable increases in water yield or consequent changes in flow regime. As such, implementation of the action alternative is anticipated to have a negligible risk of low impact on channel form in this analysis area.

As part of the consideration of cumulative effects, all direct, indirect and other related impacts described in the Existing Conditions and Environmental Effects for the No-Action Alternative would be expected to continue. Additionally, low direct and indirect impacts may occur to sediments and negligible direct and indirect impacts may occur to channel forms, as a result of implementing the proposed actions. Considering all of these impacts collectively, high cumulative impacts to fisheries resources are expected in the assessment area.

Blackfoot River-Lahrity Lake Analysis Area

Action Alternative: Direct, Indirect, and Cumulative Effects

Proposed actions potentially affecting fisheries resources in the Blackfoot River-Lahrity Lake Analysis Area include;

- Use, maintenance, and/or construction of main and secondary haul routes for timber and equipment transportation
- Construction, maintenance, and/or removal of road-stream crossings on perennial and intermittent streams
- Upland timber harvest

No direct effects to fisheries populations (presence/absence, genetic purity) are expected to occur in this analysis area under the proposed action alternative. Westslope cutthroat trout are present in Pearson Creek, and would continue to be affected by interactions with brook and brown trout. Adverse impacts of non-native species will continue to occur at the same levels as described under the *Existing Environment*. One stream crossing on Pearson Creek currently limits connectivity in the watershed. The structure is proposed to be removed following completion of this project. Based on the improvement of connectivity in this analysis area there will be a net benefit to fish populations in the analysis area. Therefore, based on the proposed actions in this analysis area, there is an anticipated continued high adverse effect on fisheries populations and a high positive effect on fish connectivity.

Within the analysis area, increased truck traffic will occur as a result of timber hauling and equipment transportation. This increase may accelerate mobilization and erosion of road surface material at road-stream crossings (Reid and Dunne 1984, Bilby et al. 1989, Coker et al. 1993, Luce and Black 2001). Within the analysis area there are four perennial stream crossings, of which, three will be utilized as a part of the proposed actions. One crossing site does not meet BMPs and is likely contributing sediment to Pearson Creek periodically and will be removed at the end of the project, reducing potential sediment delivery. During removal of the structure, sediment levels will likely increase above baseline levels, the duration and magnitude of this increase in sediment is expected to be short-term in duration and low magnitude relative to the existing condition. Three intermittent stream crossings are present in the analysis area and will be utilized during forest management activities. Structures will be brought up to BMP standards during the timber sale. No new road construction is proposed in this analysis area within 300 feet of perennial or intermittent streams. Based on the proposed actions in this analysis area there is a low risk of short-term low impact to sediment with an associated long-term benefit through removal of the existing crossing site on Pearson Creek.

As described in the Attachment E (Water Resources Analysis), the levels of proposed timber harvest are not expected to lead to measurable increases in water yield or consequent changes in flow regime. Based on the expected alterations to flow regimes from upland harvest there is a negligible risk of low impacts on channel form in this analysis area.

As part of the consideration of cumulative effects, all direct, indirect and other related impacts described in the Existing Conditions and Environmental Effects for the No-Action Alternative would be expected to continue. Adverse interactions between native and non-native species will continue in the analysis area, however, positive benefits of stream crossing removal may be realized through significant improvement in stream connectivity and reduction in sediment delivery. Additionally, as a result of implementing the proposed actions, low direct and indirect impacts may occur to sediments and negligible direct and indirect impacts may occur to channel forms. Considering all of these impacts collectively, moderate cumulative impacts to fisheries resources are expected in the assessment area, an improvement over the existing condition.

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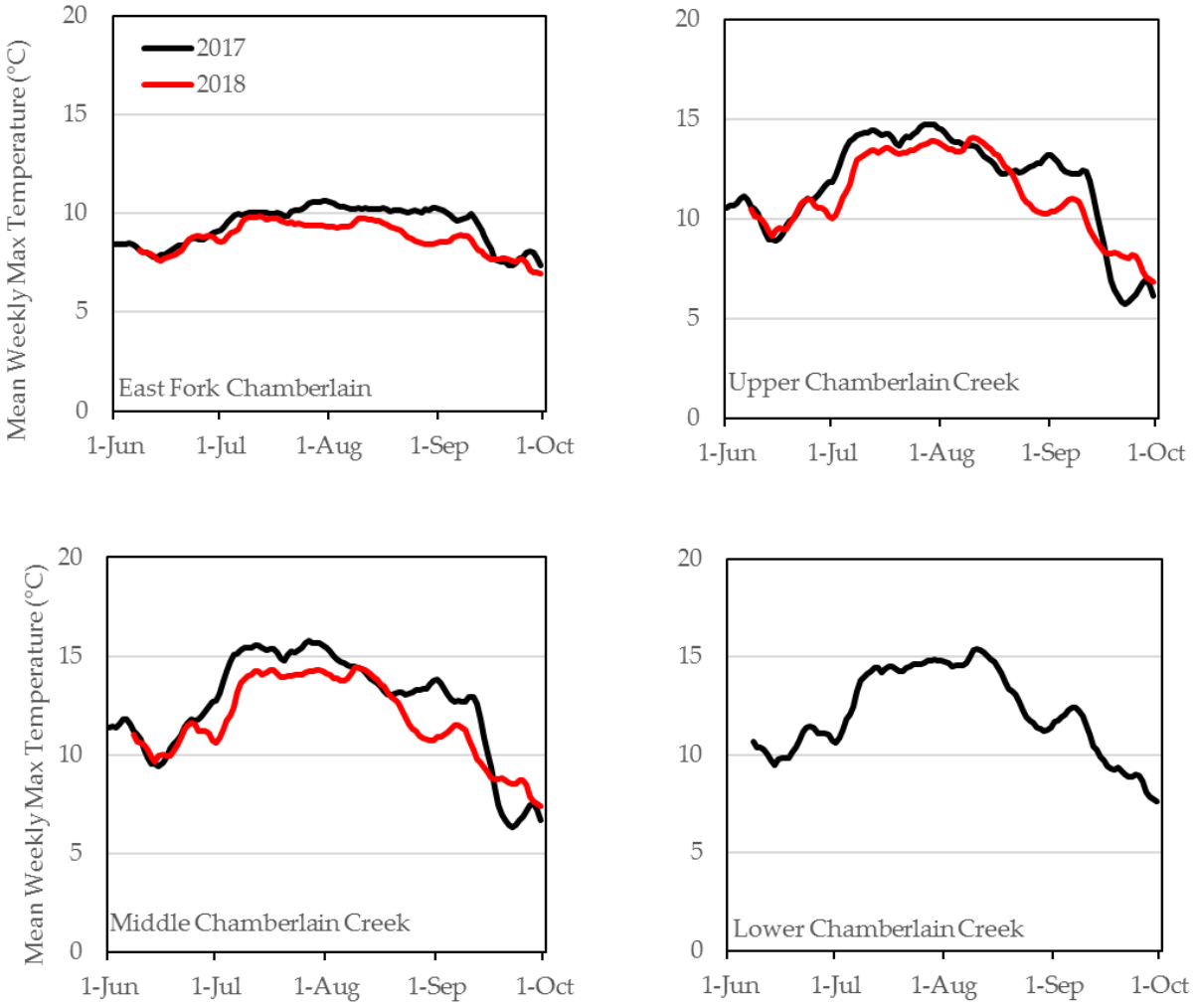

YEAR	Site Name	Start Date	Stop date	Days > 10.0 C	Days > 15.0 C	Days > 21.1 C	Hours > 10.0 C	Hours > 15.0 C	Hours > 21.1 C
2017	Middle Chamberlain	05/05/17	10/05/17	102	22	0	2025.0	127.0	0.0
	Upper Chamberlain	05/05/17	10/05/17	98	5	0	1830.0	15.5	0.0
	East Fork Chamberlain	05/05/17	10/05/17	51	0	0	147.0	0.0	0.0
2018	Lower Chamberlain	06/05/18	10/04/18	92	12	0	1520.0	29.5	0.0
	Middle Chamberlain	06/05/18	10/04/18	91	2	0	1563.0	5.5	0.0
	Upper Chamberlain	06/05/18	10/04/18	84	0	0	1369.0	0.0	0.0
	East Fork Chamberlain	06/05/18	10/04/18	6	0	0	12.0	0.0	0.0

Figure F-1: Stream temperature monitoring in Chamberlain, East Fork Chamberlain, and West Fork Chamberlain creeks, 2017–2018.

Table F-2: Presence/absence and occupied river miles of fish populations in the Pearson Patches Timber Sale analysis areas.

Species		Analysis Area		Project Area	
		Chamberlain	Blackfoot R. Lahrity Lake	Chamberlain	Blackfoot R. Lahrity Lake
Native	Bull Trout	X (4.4)	X (5.6)	X (1.4)	
	Westslope Cutthroat Trout	X (14.8)	X (13.5)	X (3.6)	X (2.7)
	Mountain Whitefish	X (2.7)	X (5.6)		
	Largescale Sucker	X (1.0)	X (2.4)		
	Longnose Sucker	X (2.8)	X (7.3)		X (0.3)
	Longnose Dace	X (1.0)	X (2.8)		
	Northern Pikeminnow		X (5.6)		
	Redside Shiner	X (2.7)	X (5.6)		
	Columbia Slimy Sculpin	X (4.0)		X (1.3)	
	Mottled Sculpin	X (2.0)			
	Rocky Mountain Sculpin	X (3.0)	X (1.0)	X (0.7)	
Non-native	Brook Trout	X (6.7)	X (13.5)	X (1.3)	X (2.7)
	Brown Trout	X (4.4)	X (7.6)	X (1.3)	X (0.6)
	Rainbow Trout	X (3.8)	X (5.6)	X (1.3)	

Table F-3: Existing, planned construction, and planned abandonment of roads in the Pearson Patches Timber Sale analysis areas.

Analysis Area	Road Class	Road Miles within 300 ft		Road-Stream Crossings	
		Perennial Stream	Intermittent Stream	Perennial Stream	Intermittent Stream
Chamberlain Creek	Existing	0.66	3.14	9	4
	New Construction	0.06	0.08	0	0
	To Be Abandoned/Reclaimed	0.05	0.07	0	0
Blackfoot River-Lahrity Lake	Existing	1.24	2.29	4	2
	New Construction	0	0	0	0
	To Be Abandoned/Reclaimed	0	0	1	0

Pearson Patches – Wildlife Analysis

Analysis Prepared By:
Name: Garrett Schairer
Title: Wildlife Biologist, Montana DNRC

Introduction

The following sections disclose the anticipated direct, indirect, and cumulative effects to wildlife resources from the proposed action in the project area and cumulative-effects analysis areas described for each resource category. Past and ongoing activities on all ownerships, as well as planned future agency actions, have been considered in each cumulative-effects analysis for each resource topic.

Issues

Proposed activities could alter mature forested habitats and/or landscape connectivity, which could affect species that rely on these mature forested habitats, and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.
Proposed activities could alter cover, reduce secure areas, and increase access, which could affect grizzly bears by displacing them from important habitats and/or increasing risk to bears of human-caused mortality.
Proposed activities could negatively affect Canada lynx by altering lynx winter foraging habitat, summer foraging habitat, and other suitable habitat, rendering these habitats unsuitable for supporting lynx.
Proposed activities could negatively affect bald eagles by reducing nesting and perching structures and/or disturbing nesting bald eagles
Proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.
Proposed activities may alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, while potentially removing snags needed by flammulated owls for nesting.
Proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.
Proposed activities could reduce suitable nesting and foraging habitat for pileated woodpeckers, which could alter pileated woodpecker use of the area.
Proposed activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range
Proposed activities could remove big game security cover, which could affect hunter opportunity and local quality of recreational hunting.

Regulatory Framework

Various legal documents dictate or recommend management direction for terrestrial wildlife species and their habitats on state trust lands. The documents most pertinent to this project include DNRC Forest Management Rules, the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.

Analysis Areas

The discussions of existing conditions and environmental effects within each subsection pertain to land areas of 2 different scales. The first scale of analysis is the Project Area (7,469 acres), which includes DNRC-managed lands in sections 10, 11, 12, 13, 14, 15, 16, and the portions of sections 4, 9, and 17 that are east of Chamberlain Creek in T14N, R13W and sections 7, 17, 18, 19, and 20 in T14N R12W where activities are being proposed. The second scale is the

cumulative-effects analysis area, which refers to a broader surrounding landscape useful for assessing cumulative effects to wildlife and habitat. For this proposed project, two distinct cumulative-effects analysis areas were identified. The first cumulative effects analysis area includes the project area and those lands within 1 mile of the project area (44,312 acres). This area includes 9,740 acres (47%) that are managed by DNRC, 7,545 acres (36%) that are privately-owned, 2,858 acres (14%) that are managed by US Bureau of Land Management (BLM), 538 acres (3%) that are managed by The Nature Conservancy (TNC), and 66 acres (<1%) managed by Montana Fish, Wildlife, and Parks (FWP). The second cumulative effects analysis area is approximately 44,312 acres and includes the area south of the Blackfoot River, and bounded between Baldy Mountain, Bata Mountain, Lost Horse Mountain, Chamberlain Meadows, and down Wales Creek back to the Blackfoot River. This cumulative-effects analysis area contains sizeable areas managed by US Bureau of Land Management (16,992 acres, 38%), DNRC (14,441 acres, 33%), and in private ownership (10,920 acres, 25%), with smaller amounts managed by TNC (1,513 acres, 3%), and Montana FWP (116 acres, <1%).

Analysis Methods

Analysis methods are based on DNRC State Forest Land Management Rules, which are designed to promote biodiversity. The primary basis for this analysis includes information obtained by: field visits, review of scientific literature, Montana Natural Heritage Program (MNHP) data queries, DNRC Stand Level Inventory (SLI) data analysis, aerial photograph analysis, and consultation with other professionals.

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species federally listed under the Endangered Species Act, species listed as sensitive by DNRC, and species managed as big game by the Montana Dept. of Fish Wildlife and Parks (DFWP).

Coarse Filter Wildlife Analysis

Issue

Proposed activities could alter mature forested habitats and/or landscape connectivity, which could affect species that rely on these mature forested habitats, and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.

Introduction

A variety of wildlife species rely on mature to old stands for some or all life requirements. Mature forests, generally characterized by abundant large diameter trees and dense canopy cover, play an important role in providing food, shelter, breeding sites, resting areas, and/or travel corridors for certain animals. Wildlife use of older, mature forests is species-specific; some species use this habitat exclusively, other species only temporarily or seasonally, and some species avoid mature forests altogether. Several species known to be strongly associated with mature and old forests include American marten (*Martes americana*), northern goshawk (*Accipter gentilis*), and winter wrens (*Troglodytes troglodytes*).

Forested landscapes in the western United States were historically shaped by natural disturbance events; primarily wildfire, blowdown, and pest outbreaks. Resulting broad landscape patterns were a mosaic of forest patches varying in age, composition and development. Timber harvest, like stand-replacement fire and blowdown, is a disturbance event that can create open, non-forested patches that over time develop into young, conifer forests. Patch size, age, shape, abundance, and distance to similar patches (connectivity) can be factors influencing wildlife use. The way through which patch characteristics influence wildlife use and distribution are dependent upon the particular species and its habitat requirements. Temporary non-forested openings, patches, and forest edges created by timber harvest and associated roads may be avoided by certain wildlife species adapted to mature, well-stocked forest. In contrast, other wildlife species flourish in early seral habitats created by disturbance. Connectivity under historical fire regimes within forest types found in the vicinity of the project area was likely relatively high as fire differentially burned various habitats across the landscape (Fischer and Bradley 1987).

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on a 44,312-acre area described above in the Analysis Areas portion of this analysis. This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Affected Environment

The project area currently contains approximately 3,144 acres (42% of project area) of mature stands (100-plus years in age) of Douglas-fir, western larch, Douglas-fir/western larch, and lodgepole pine stands that have a reasonably closed canopy. Currently, forested areas cover most of the project area, facilitating some use by those species requiring connected-forested conditions and/or forested-interior habitats. Ongoing tree mortality within the project area is altering existing forested cover, forested-interior habitats, and landscape connectivity.

Roughly 6,388 acres of mature stands of Douglas-fir, western larch, Douglas-fir/western larch, and ponderosa pine exist on DNRC-managed lands within the cumulative effects analysis area. A portion of the 17,372 acres (59% non-DNRC lands) of forested habitats and some of the 5,007 acres (17% non-DNRC lands) of moderately stocked forested stands on other ownerships in the cumulative effects analysis area are likely also providing habitat for those species requiring mature, forested habitats and/or forested connectivity. Conversely, much of the 7,189 acres (24% of non-DNRC lands) of burned areas, shrubs, herbaceous areas, poorly stocked forested stands, and recently harvested stands on other ownerships in the cumulative effects analysis area is likely too open to be useful for these species requiring forested habitats. Ongoing tree mortality within the cumulative effects analysis area is altering existing forested cover, forested-interior habitats, and landscape connectivity. Past timber management, human developments, roads, and the natural openness of certain habitats in the cumulative effects analysis area has influenced landscape-level connectivity in the cumulative effects analysis area. Ongoing modifications to stand densities on 2,041 acres of DNRC-managed lands associated with the West Chamberlain 2017 pre-commercial thinning project and 669 acres of BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects could be disturbing wildlife species using these younger-aged stands in the cumulative effects analysis area, but are not expected to appreciably alter mature forested habitats or connectivity. Similarly, ongoing timber management (673 acres) and prescribed fire (1,483 acres) associated with the Chamberlain-Wales Resource Management Projects on BLM-managed lands in the cumulative effects analysis area could further contribute to potential disturbance of wildlife using mature-forested habitats while altering mature forested stands and landscape connectivity.

Environmental Effects- Mature Forested Habitats and Landscape Connectivity

No Action Alternative: Direct and Indirect Effects

No appreciable changes to existing stands would be anticipated. Stands providing forested cover that may be functioning as corridors, including riparian areas, saddles, and ridgelines, would not be altered. Continued tree mortality would further alter existing forested cover, forested-interior habitats, and landscape connectivity. No changes in human developments, motorized access, or visual screening would occur. No changes in wildlife use would be expected. Thus, no direct or indirect effects to mature forested habitats and landscape connectivity would be expected since: 1) no further changes to existing stands would occur; 2) no changes to human developments, motorized access, or visual screening would occur, and 3) no alterations to existing corridors would be anticipated.

No Action Alternative: Cumulative Effects

No appreciable changes to existing stands would be anticipated. Stands providing forested cover that may be functioning as corridors, including riparian areas, saddles, and ridgelines, would not be altered. Ongoing tree mortality within the cumulative effects analysis area is altering existing forested cover, forested-interior habitats, and landscape connectivity. Past harvesting has reduced the amount of mature, forested habitats in a portion of the cumulative effects analysis area; however, continued successional advances across the cumulative effects analysis area are moving stands toward mature forests. This alternative would not further reduce the amount of mature forested stands in the cumulative-effects analysis area. No changes in human developments, motorized access, or visual screening would

occur. No changes in wildlife use would be expected. Thus, no cumulative effects to mature forested habitats and landscape connectivity would be expected since: 1) no further changes to existing stands would occur; 2) no changes to human developments, motorized access, or visual screening would occur; and 3) no alterations to existing corridors would be anticipated.

Action Alternative: Direct and Indirect Effects

Approximately 1,387 acres (44%) of existing mature Douglas-fir, western larch, western larch/Douglas-fir, and lodgepole pine stands with a reasonably closed canopy would be harvested. In general, habitats for those species adapted to more-open forest conditions would increase in the project area, meanwhile habitats for wildlife species that prefer dense, mature forest conditions would be reduced in the project area. Although proposed harvesting and thinning on 2,419 acres (32% of the project area) would create more open stands that may be less suitable for wildlife species that use mature stands to move through the landscape, corridors, particularly along riparian features, would be retained. Proposed pre-commercial thinning and any planting would improve the development of future mature forested stands in those areas treated. No changes in legal motorized public access would occur in the project area. Additionally, the only permanent human development constructed would be roughly 0.65 miles of new, restricted roads; however, this could increase non-motorized human activity in the project area beyond the proposed timber management activities. Contract stipulations would minimize the presence of human-related attractants for the duration of the proposed activities. Some changes in visual screening would occur within individual units, but the combination of irregular-shaped units, topography, un-harvested patches throughout the project area, and distance from open roads would minimize the effects of the reductions in visual screening. Thus, a minor risk of adverse direct and indirect effects to mature forested habitats and landscape connectivity would be expected since: 1) proposed activities could reduce forested cover in a sizeable portion of the project area (32%), but corridors would be retained; 2) increased human developments in the form of restricted roads, could concentrate human activity, but no changes in human-related attractants would occur; 3) no changes to legal motorized public access would occur, but increases in non-motorized access could facilitate increased human use of the project area; and 4) visual screening in portions of the project area would be reduced, but some visual screening would be retained across the project area.

Action Alternative: Cumulative Effects

Modifications to mature, forested habitats associated with this alternative would be additive to losses associated with past harvesting activities in the cumulative effects analysis area as well as ongoing activities in the cumulative effects analysis area on BLM-managed lands. Across the cumulative effects analysis area, a variety of stands are providing for wildlife movements. Minor increases in human developments would occur with the proposed construction of roughly 0.65 miles of restricted roads. No changes in the presence of human-related attractants would occur. No changes to legal motorized public access to the cumulative effects analysis area would occur. Minor reductions in visual screening in a small portion of the cumulative effects analysis area would be anticipated. Thus, a minor risk of adverse cumulative effects to mature forested habitats and landscape connectivity would be expected since: 1) proposed activities could reduce forested cover in a small portion of the cumulative effects analysis area, but corridors would exist; 2) minor increases in human developments that could concentrate human activities would occur, but no changes in human-related attractants would occur; 3) no changes to motorized public access would occur; and 4) visual screening in a small portion of the cumulative effects analysis area would be reduced, but considerable visual screening would persist across the cumulative effects analysis area.

Fine Filter Wildlife Analysis

In the fine-filter analysis, individual species of concern are evaluated. These species include those listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and animals managed as big game by Montana DFWP. Table WI-1 – Fine Filter provides an analysis of the anticipated effects for each species.

Table WI-1 –Anticipated Effects of the Pearson Patches Project on wildlife species

Species/Habitat	Potential for Impacts and Rationale [Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below) L = Low Potential for Effects
Threatened and Endangered Species	
Grizzly bear *(Ursus arctos)* Habitat: Recovery areas, security from human activity	[Y] Detailed analysis provided below.
Canada lynx (*Felix lynx)* Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zone	[Y] Detailed analysis provided below.
Yellow-Billed Cuckoo (*Coccyzus americanus)* Habitat: Deciduous forest stands of 25 acres or more with dense understories and in Montana these areas are generally found in large river bottoms	[N] No suitable deciduous riparian habitats are in the project area. Thus, no direct, indirect, or cumulative effects to yellow-billed cuckoos would be expected to occur as a result of either alternative.
Sensitive Species	
Bald eagle *(Haliaeetus leucocephalus)* Habitat: Late-successional forest less than 1 mile from open water	[Y] Detailed analysis provided below.
Black-backed woodpecker *(Picoides arcticus)* Habitat: Mature to old burned or beetle-infested forest	[N] No preferred, recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Coeur d'Alene salamander *(Plethodon idahoensis)* Habitat: Waterfall spray zones, talus near cascading streams	[N] No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.

Columbian sharp-tailed grouse *(Tympanuchus Phasianellus columbianus)* Habitat: Grassland, shrubland, riparian, agriculture	[N] No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon *(Gavia immer)* Habitat: Cold mountain lakes, nest in emergent vegetation	[N] No suitable lakes occur in the project area. Thus no direct, indirect, or cumulative effects to common loons would be expected under either alternative.
Fisher *(Pekania pennanti)* Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	[Y] Detailed analysis provided below.
Flammulated owl *(Otus flammeolus)* Habitat: Late-successional ponderosa pine and Douglas-fir forest	[Y] Detailed analysis provided below.
Gray Wolf *(Canis lupus)* Habitat: Ample big game populations, security from human activities	[Y] Detailed analysis provided below.
Harlequin duck *(Histrionicus histrionicus)* Habitat: White-water streams, boulder and cobble substrates	[N] No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Mountain plover (*Charadrius montanus*) Habitat: short-grass prairie, alkaline flats, prairie dog towns	[N] No prairie dog colonies or other shortgrass prairie habitats occur in the project area. Thus, no direct, indirect, or cumulative effects to mountain plovers would be anticipated to occur as a result of either alternative.
Northern bog lemming *(Synaptomys borealis)* Habitat: Sphagnum meadows, bogs, fens with thick moss mats	[N] No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.

Peregrine falcon *(Falco peregrinus)* Habitat: Cliff features near open foraging areas and/or wetlands	[N] No preferred cliffs or suitable rock outcrops suitable for use by peregrine falcons occur on, or within 1 mile of the proposed project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
Pileated woodpecker *(Dryocopus pileatus)* Habitat: Late-successional ponderosa pine and larch-fir forest	[Y] Detailed analysis provided below.
Townsend's big-eared bat *(Plecotus townsendii)* Habitat: Caves, caverns, old mines	[N] No suitable caves or mine tunnels are known to occur in the project area or vicinity. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats would be anticipated as a result of either alternative.
Wolverine *(Gulo gulo)* Habitat: Alpine tundra and high-elevation boreal and coniferous forests that maintain deep persistent snow into late spring	[N] Generally wolverines are found in sparsely inhabited remote areas near treeline characterized by cool to cold temperatures year round and rather deep and persistent snow well into the spring (Copeland et al. 2010). The availability and distribution of food is likely the primary factor in the large home range sizes of wolverines (Banci 1994). The project area is generally below the elevations where wolverines tend to be located. No areas of deep persistent spring snow occur in the project area. Individual animals could occasionally use lands in the project area while dispersing or possibly foraging, and they could be displaced by project-related disturbance if they are in the area during proposed activities. However, given their large home range sizes (~150 sq. mi. -- Hornocker and Hash 1981), and manner in which they use a broad range of forested and non-forested habitats, the proposed activities and alterations of forest vegetation on the project area would have negligible influence on wolverines. Thus, minimal direct, indirect or cumulative effects to wolverines would be anticipated.
Big Game Species	
Elk	[Y] Big game winter range exists in the project area. Potential big game security habitat exists in the project area - Detailed analysis provided below.
Moose	
Mule Deer	
White-tailed Deer	

Threatened and Endangered Species

GRIZZLY BEAR

Issue

Proposed activities could alter cover, reduce secure areas, and increase access, which could affect grizzly bears by displacing them from important habitats and/or increasing risk to bears of human-caused mortality.

Introduction

Grizzly bears are native generalist omnivores that use a diversity of habitats found in western Montana. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. The search for food drives grizzly bear movements, with bears moving from low elevations in spring to higher elevations through the summer and early fall, as fruits ripen throughout the year. Primary threats to grizzly bears are related to human-bear conflicts, habituation to unnatural foods near high-risk areas, and long-term habitat loss associated with human development (Mace and Waller 1997). Forest-management activities may affect grizzly bears by altering cover and/or by increasing human access into secure areas by creating roads (Mace et al. 1997). These actions could lead to the displacement of grizzly bears from preferred areas and/or result in an increased risk of human-caused mortality by bringing humans and bears closer together and/or making bears more detectable, which can increase the risk of bears being illegally shot. Displacing bears from preferred areas may increase their energetic costs, which may, in turn, lower their ability to survive and/or reproduce successfully.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on a 44,312-acre area described above in the Analysis Areas portion of this analysis. This area approximates the home range size of a female grizzly bear.

Existing Environment

The project area is 7 miles south of the Northern Continental Divide Ecosystem grizzly bear recovery area, and within `occupied' grizzly bear habitat as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (Wittinger et al. 2002). However, grizzly bears are increasingly being documented south of the recovery zone. Grizzly bears have been documented in the project area in the past and continued use of the project area is likely. Grizzly bears generally use different habitats relative to season, but the combination of habitat attributes in the project area supports grizzly bears throughout the non-denning period. Managing human access is a major factor in management for grizzly bear habitat. There is a minor amount of open roads (5.8 miles; 0.5 mi./sq. mi., simple linear calculation) in the project area. Extensive non-motorized access to the project area exists given the presence of the open roads, the level of access to higher terrain, and the 65.9 miles of restricted roads in the project area. Open road densities are relatively low in the cumulative effects analysis area (0.65 mi./sq. mi., simple linear calculation); the potential for disturbance to grizzly bears in the cumulative effects analysis area is also fairly high given this level of access. Hiding cover exists on roughly 4,030 acres (54%) in the project area. No grizzly bear security habitats (≥ 0.3 miles from roads receiving motorized use and ≥2,500 acres in size) exist solely within the project area, but 2 pockets of habitat in the project area contribute to a larger, 30,981-acre block of potential security cover that extends beyond the project area.

Within the cumulative effects analysis area, roughly 8,176 acres of grizzly bear hiding cover exists on DNRC-managed lands. Grizzly bear hiding cover is likely present on some of the 17,372 acres (59% of non-DNRC lands) of forested stands across the cumulative effects analysis area on other ownerships. Within the cumulative effects analysis area, hiding cover is largely absent from the 7,189 acres (24% of non-DNRC lands) of burned habitats, shrubs, herbaceous, and non-forested habitats and is likely somewhat limited on the other 5,007 acres (17% of non-DNRC lands) of sparsely stocked and young forest habitats in the cumulative effects analysis area. While no grizzly bear security habitats exist solely in the project area, portions of the project area contribute to a 30,981-acre block of potential grizzly bear security habitat;

this block of potential grizzly bear security habitats look to extend beyond the boundaries of the cumulative effects analysis area as well. Timber harvesting and human development that has occurred in the cumulative effects analysis area likely altered grizzly bear habitats and/or human disturbance levels. Ongoing modifications to stand densities on 2,041 acres of DNRC-managed lands associated with the West Chamberlain 2017 pre-commercial thinning project and 669 acres of BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects could be potentially disturbing grizzly bears in the cumulative effects analysis area, but are not expected to affect open road densities, total road densities, security habitats, Similarly, ongoing timber management (673 acres) and prescribed fire (1,483 acres) associated with the Chamberlain-Wales Resource Management Projects in the cumulative effects analysis area could further contribute to grizzly bear disturbance, as well as changes in hiding cover, security habitat, and open road densities.

Environmental Effects- Grizzly Bears

No Action Alternative: Direct and Indirect Effects

No direct or indirect effects to grizzly bears would be anticipated since: 1) no further disturbance or displacement would be expected, 2) no further changes in hiding cover would occur, 3) security habitat would not be altered, 4) no changes in long-term open-road density would be anticipated, and 5) no changes in availability of unnatural bear foods or attractants would occur.

No Action Alternative: Cumulative Effects

No appreciable changes to existing habitats would be anticipated; advances in succession within those recently harvested stands could improve hiding cover and potentially foraging habitats for grizzly bears. Thus, no further adverse cumulative effects to grizzly bears would be anticipated since: 1) no further changes in human disturbance levels would be expected; 2) no changes to open road density would occur; 3) no further modifications to hiding cover would occur; 4) no changes to security habitat would be expected; and 5) no changes in availability of unnatural bear foods or attractants would occur.

Action Alternative: Direct and Indirect Effects

This alternative might affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources in the project area. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area. These potential disturbances would only be present during proposed operations; therefore, the season of disturbance is important in addressing effects to grizzly bears. Proposed harvesting could occur during the denning period or the non-denning period but would avoid the spring period (April 1-June 15) when grizzly bears are more sensitive to human disturbance. Proposed activities conducted in the denning period would not be expected to disturb grizzly bears; some disturbance to grizzly bears would be possible with proposed activities that may occur during the non-denning period. Grizzly bears would be expected to still use the area during the remaining portion of the non-denning period (June 16 - November 15) after the spring closure but would be able to access considerable other habitats in the vicinity, which would limit potential disturbance to bears. Overall, the proposed activities would occur in areas where moderate levels of grizzly bear use would be anticipated but would occur during a time period when habitat availability would not be limited, thus minor potential for disturbance and displacement of grizzly bears would be anticipated.

About 0.65 miles of new, restricted roads would be constructed with the proposed activities. No changes in open road density or motorized public access would be anticipated. No appreciable changes in non-motorized public access could occur, thus no changes in contact between humans and grizzly bears would occur. Mitigations would be included to retain at least 100 feet of vegetation between open roads and harvest units to reduce human detection of bears and reduce the potential of disturbing grizzly bears. Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced on most of the 1,347 acres (33%) of hiding cover proposed to receive treatments. To reduce the potential avoidance of harvest units and provide some security, proposed seedtree harvest

units would be laid out to ensure that no point of the unit exceeds 600 feet to vegetative cover or topographic break. Additionally, prior to initiating any pre-commercial thinning, proposed units would be re-evaluated to ensure that adequate grizzly bear hiding cover would persist following treatments to meet this maximum distance to hiding cover requirement. Some hiding cover in the form of brush, shrubs, and sub-merchantable trees would persist in several of the units, albeit at a reduced level from the existing condition; hiding cover would increase through time as young trees and shrub regeneration proceeds over the next 5 to 10 years. Although hiding cover would be reduced, no appreciable changes to security habitat would occur given no changes in open roads would occur in the project area.

Any unnatural bear foods or attractants (such as garbage) would be kept in a bear resistant manner. Any added risk to grizzly bears associated with unnatural bear foods or attractants would be minimal. Thus, a minor risk of adverse direct or indirect effects to grizzly bears would be anticipated since: 1) minor disturbance and displacement would be possible; 2) hiding cover would be reduced in a portion of the project area, but would remain in portions of the project area, and would be expected to recover in the short-term; 3) habitats in potential security habitat would be modified, but no changes in the availability of security habitats would occur; 4) no changes to long-term open road density would be anticipated; and 5) negligible increases in the availability of unnatural bear foods or attractants would be anticipated.

Action Alternative: Cumulative Effects

The increased use of road systems during the proposed project could temporarily increase human disturbance to grizzly bears within a portion of the cumulative effects analysis area. Collectively, short-term (2-4 years) increases in human disturbance would be anticipated in the cumulative effects analysis area. Continued use of the cumulative effects analysis area by grizzly bears would be anticipated at levels similar to present. Hiding cover would be reduced on roughly 1,347 acres with the proposed treatments; any disturbance and habitat modifications associated with the West Chamberlain pre-commercial thinning project and the Chamberlain-Wales Resource Management Projects would continue. No further changes to the hiding cover on other ownerships would be anticipated. Reductions in hiding cover would be additive to the reductions from past timber harvesting, ongoing harvesting, as well as more permanent land-cover changes in the cumulative effects analysis area. Changes in hiding cover could concentrate grizzly bear use, but would not be expected to alter level of use of the cumulative effects analysis area. Early successional stages of vegetation occurring in harvest units could provide additional foraging opportunities for grizzly bears. Quality of grizzly bear security habitat would be reduced in short-term but would persist through time. No changes in long-term open-road density would be anticipated; a slight increase in non-motorized access to a small portion of the cumulative effects analysis area could occur with the proposed construction of roughly 0.65 miles of new, restricted roads. Thus, a minor risk of adverse cumulative effects to grizzly bears would be anticipated since: 1) increases in human disturbance levels in the short-term could occur in a small portion of the cumulative effects analysis area; 2) hiding cover would be removed in the short-term on 1,347 acres in the cumulative effects analysis area; 3) no changes in long-term open road density would occur, 4) quality of security habitats would be reduced, but would persist into the future; and 5) negligible increases in the availability of unnatural bear foods or attractants would be anticipated.

CANADA LYNX

Issue

Proposed activities could negatively affect Canada lynx by altering lynx winter foraging habitat, summer foraging habitat, and other suitable habitat, rendering these habitats unsuitable for supporting lynx.

Introduction

Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). Lynx in western Montana preferred mature, multi-storied stands with dense horizontal cover year-round; during the summer lynx also selected earlier successional stands with a high horizontal cover (Squires et al. 2010). For denning sites, the primary component appears to be abundant large woody debris, particularly in the

form of downed logs, root wads, slash piles, and live trees (Squires et al. 2008). These conditions are found in a variety of climax vegetation habitat types, particularly within the subalpine fir series (Pfister et al. 1977). Historically, high intensity, stand-replacing fires of long fire intervals (150 to 300 years) occurred in continuous dense forests of lodgepole pine, subalpine fir, and Engelmann spruce. These fires created extensive even-aged patches of regenerating forest intermixed with old stands that maintained a mosaic of snowshoe hare and lynx habitat.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on a 44,312-acre area described above in the Analysis Areas portion of this analysis. The scale of this analysis area approximates the home range size of an individual lynx (Ruediger et al. 2000).

Existing Environment

The project area ranges from approximately 4,040 to 6,000 feet in elevation and is dominated by Douglas-fir, Douglas-fir/western larch, and lodgepole pine. The project area is in the Garnet Range, which supports lynx, but the area appears to have fewer lynx now than historically existed in the range. Approximately 2,374 acres of lynx habitat occur in the project area (Table WI-2 – Canada lynx habitats and anticipated changes to existing lynx habitats under both alternatives of the Pearson Patches Project). Much of this habitat is winter foraging habitats and summer foraging habitats, with smaller amounts of other suitable habitats (largely forested lands that provide cover to facilitate movement) and temporary non-suitable habitats. Connectivity of forested habitats is moderate and past timber management along with ongoing tree mortality has had a sizable effect on landscape connectivity for Canada lynx in the project area.

On DNRC-managed lands within the cumulative effects analysis area, roughly 2,224 acres of winter lynx foraging habitats exist, 771 acres of summer foraging habitats, 714 acres of other suitable habitats, and 222 acres of temporary non-suitable habitats. On other ownerships, there are roughly 17,372 acres (58% of non-DNRC lands) of forested stands across the cumulative effects analysis area; a portion of those stands would likely be suitable lynx habitats and probably include some winter foraging habitats. Additionally, summer foraging habitats likely exists on a portion of the 5,007 acres (17% of non-DNRC lands) of sparsely stocked and young forest stands on other ownerships; no lynx habitats likely exist on the 7,189 acres (24% of non-DNRC lands) of shrubs, herbaceous, and non-forested types on other ownerships in the cumulative effects analysis area. Connectivity of lynx habitats within the cumulative effects analysis area is somewhat limited due to ownership, past timber management, human developments, agricultural fields, and the natural openness of certain habitats in the cumulative effects analysis area. Ongoing modifications to stand densities on 2,041 acres of DNRC-managed lands associated with the West Chamberlain 2017 pre-commercial thinning project and 669 acres of BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects could be altering stand densities within summer foraging habitats in the cumulative effects analysis area, but largely these would continue to be suitable for lynx either as summer foraging habitats or other suitable habitats. Similarly, ongoing timber management (673 acres) and prescribed fire (1,483 acres) associated with the same series of projects on BLM-managed lands in the cumulative effects analysis area could further increase the amount of temporary non-suitable habitats at the expense of winter foraging, and other suitable habitats. Roughly 80% of habitats on DNRC-managed lands administered by the Southwestern Land Office under the HCP and outside of the Lynx Management Areas are in suitable lynx habitat categories.

Environmental Effects- Canada Lynx

No Action Alternative: Direct and Indirect Effects

In the short-term, no further changes in lynx habitat elements would be expected in the project area. Landscape connectivity would not be altered. Thus, a negligible risk of adverse direct and indirect effects to Canada lynx would be expected since: 1) existing winter foraging habitats would persist; 2) summer foraging habitats would continue to be a small component in the project area and would continue to disappear through time; 3) the amount of temporary non-suitable habitats would not change; and 4) landscape connectivity would not be altered.

No Action Alternative: Cumulative Effects

No appreciable change in lynx habitats in the cumulative effects analysis area would occur. No appreciable changes to landscape connectivity would be anticipated. Roughly 80% of habitats on DNRC-managed lands administered by the Southwestern Land Office under the HCP and outside of the Lynx Management Areas would be in suitable lynx habitat categories with this alternative. Thus, a negligible risk of adverse cumulative effects to lynx would be expected since: 1) winter foraging habitats would persist in the cumulative effects analysis area; 2) summer foraging habitats would persist

in the near-term across the cumulative-effects analysis area, but longer-term availability of summer foraging habitats would likely decline without disturbance; 3) no changes in the amount of the cumulative-effects analysis area that is in the temporary non-suitable habitat class would occur; and 4) landscape connectivity would not be altered.

Action Alternative: Direct and Indirect Effects

Most of the proposed activities would not occur in mapped lynx habitats (1,714 acres; 71% of proposed units) and would not be expected to appreciably affect lynx; approximately 705 acres of lynx habitats (30% of lynx habitats in the project area) would be altered with this alternative (Table WI-2 – Canada lynx habitats and anticipated changes to existing lynx habitats under both alternatives of the Pearson Patches Project). The proposed treatments in lynx habitats would be a combination of individual tree selection, commercial thin, overstory removal, seed tree, and pre-commercial thin. Proposed treatments would be expected to reduce winter foraging habitats by 286 acres (151 acres would move to other suitable and 135 acres would move to temporary non suitable habitats) and summer foraging habitats by 136 acres (122 acres moving to other suitable and 14 acres to temporary non habitats) while increasing the amount in the other suitable habitat category (by 273 acres from winter foraging and summer foraging categories while being reduced by 63 acres that move to temporary non-habitats) and temporary non-habitats (an increase of 212 acres). Thus, roughly 18% of the lynx habitats in the project area would be temporarily unsuitable for lynx following proposed treatments. Roughly 57% of the project area would be in foraging habitats and 25% would be in other suitable habitats following proposed treatments. The retention of patches of advanced regeneration of shade-tolerant trees, such as sub-alpine fir and Engelmann spruce in foraging habitats, would break-up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx. Coarse woody debris would be retained (emphasizing retention of some logs 15 inches dbh and larger) to provide some horizontal cover and security structure for lynx. Within stands proposed for pre-commercial thinning in lynx habitats, small shade tolerant trees (such as sub-alpine fir and spruce) would be retained where possible to provide potential habitat structure for snowshoe hares by increasing the levels of horizontal cover and accelerating the development of multi-storied stands. In the short-term, lynx use of the project area could decline due to the openness in the project area. Proposed activities would further reduce forested connectivity in the area; some connectivity would be retained along riparian areas and through unharvested patches between harvested units. Collectively, a moderate risk of adverse direct and indirect effects to Canada lynx would be expected since: 1) the sizable amount of winter foraging habitats (27%) would be removed, with these habitats being fairly evenly split between other suitable and temporary non-suitable habitats following proposed treatments; 2) a moderate portion of the summer foraging habitats would be altered (19%) with most of those habitats moving into the other suitable habitat category; 3) the amount of the project area in the temporary non-suitable lynx habitat category would increase to 18%; and 4) connectivity could be altered, but some connectivity would be maintained along riparian areas and through unharvested patches between units.

Table WI-2 –Acres of Canada lynx habitats and anticipated changes to existing lynx habitats under both alternatives of the Pearson Patches Project

Lynx Habitat Element	Exiting Condition and No-Action Alternative	Proposed Treatments									Action Alternative
		Individual Tree Selection	*w/ PCT	Commercial Thin	*w/ PCT	Overstory Removal	*w/ PCT	Seed Tree	*w/ PCT	Pre-commercial Thinning	
Winter Foraging	1,041 (44%)	15	27	77	4	23	0	7	63	70	755 (32%)
Summer Foraging	731 (31%)	14	0	25	0	0	0	0	0	97	595 (25%)
Other Suitable	388 (16%)	1	0	0	0	0	2	45	18	175	598 (25%)
Temporary Non-Suitable	213 (9%)	0	0	0	0	0	0	0	0	42	425 (18%)
Total Lynx Habitats	2,374										2,374
Non-Lynx Habitats	5,036	457	80	47	76	132	0	291	35	595	5,036

*-Proposed to receive a pre-commercial thinning treatment following proposed commercial treatment

Action Alternative: Cumulative Effects

Within the cumulative-effects analysis area, roughly 705 acres of lynx habitats on DNRC-managed lands (18% of DNRC-managed lynx habitats) would be modified, with similar amounts being converted to the other suitable habitat and the temporary non-suitable habitat categories. Following proposed treatments, approximately 434 acres (11% of lynx habitats on DNRC-managed lands) would be in the temporary non-suitable habitat category following proposed treatments. The reductions in winter foraging (286 acres) and summer foraging (136 acres) coupled with increases in other suitable (210 acres) and temporary non-suitable habitats (212 acres) on a small portion of the cumulative effects analysis area could slightly decrease the quality of the lynx habitats in the larger cumulative effects analysis area. Near-term increases in summer foraging habitats could occur with the proposed harvesting within a portion of the cumulative effects analysis area. Anticipated reductions in lynx habitats would be additive to past losses from timber harvesting and any ongoing modifications in the cumulative-effects analysis area. Likewise, increases in temporary non-suitable lynx habitats would be additive to habitats that have been recently converted due to timber harvesting. No appreciable changes to the suitable lynx habitats on other ownerships would be anticipated. Forest connectivity would be altered in the project area, but these reductions in connectivity would not appreciably alter connectivity in the cumulative effects analysis area. Connectivity of suitable lynx habitats along RMZs and associated riparian habitats would be maintained and overall negligible changes to connectivity across the cumulative effects analysis area would be anticipated. Roughly 79% of habitats on DNRC-managed lands administered by the Southwestern Land Office under the HCP and outside of the Lynx Management Areas would be in suitable lynx habitat categories following proposed treatments. Thus, a minor risk of adverse cumulative effects to Canada lynx would be expected since: 1) winter foraging habitats would persist; 2) summer foraging habitats would continue developing for the next 10 to 30 years across the cumulative effects analysis area; 3) a minor amount of lynx habitats would be in the temporary non-suitable habitat category; and 4) negligible alterations in landscape connectivity would not prevent lynx movements.

Sensitive Species

BALD EAGLE

Issue

Proposed activities could negatively affect bald eagles by reducing nesting and perching structures and/or disturbing nesting bald eagles

Introduction

Bald eagles are diurnal raptors associated with significant bodies of water, such as rivers, lakes, and coastal zones. The bald eagle diet consists primarily of fish and waterfowl, but includes carrion, mammals, and items taken from other birds of prey. In Montana, bald eagles begin the breeding process with courtship behavior and nest building in early February; the young fledge by approximately mid-August, ending the breeding process. Preferred nest-stand characteristics include large emergent trees that are within sight distances of lakes and rivers and screened from disturbance by vegetation.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on the composite of the home ranges associated with the River Junction, Raymond Bridge, and Blackfoot Junction bald eagle territories. This scale includes enough area for several nesting pairs of bald eagles.

Existing Environment

Portions of the project area are within the home ranges associated with the Blackfoot River Junction, River Junction, and Raymond Bridge bald eagle territories. The aquatic habitats associated with these territories include Blackfoot River, North Fork Blackfoot River, Chamberlain Creek, Pearson Creek, Dry Gulch, Frazier Creek, Lahrity Lake, Long Lake, and numerous smaller streams, ponds, and wetlands. Aquatic and terrestrial prey species are fairly common in the home ranges. The terrestrial habitat incorporated by the territories is a coniferous/deciduous mixture along the lakeshores and riparian areas, with coniferous forests and grasslands in the upland areas. Within the home ranges, black cottonwood is the deciduous tree of primary importance to bald eagles, while large emergent conifers also provide important nesting, roosting, and perching habitats.

Human disturbance, including timber harvesting, agricultural activities, and various forms of recreation are potential sources of disturbance to the nesting territories. Numerous large emergent trees are available across portions of the home range, but logging and other human developments in the last 100 years has likely reduced some of these attributes while others have experienced mortality and are declining in quality.

<u>Environmental Effects-Bald Eagle</u>

No Action Alternative: Direct and Indirect Effects

No direct or indirect effects to bald eagles would be anticipated since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees suitable for perching or nesting would be expected.

No Action Alternative: Cumulative Effects

No cumulative effects to bald eagles would be anticipated since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected.

Action Alternative: Direct and Indirect Effects

No activities would occur in the nest area or primary use areas associated with the bald eagle territories. Proposed harvesting on 403 acres (28% of proposed units) and proposed pre-commercial thinning on 582 acres (46% of proposed pre-commercial thinning units) would occur in the home range associated with the bald eagle territories. Proposed activities could occur when soils are dry, frozen, or snow covered and would not occur between April 1 and June 15. Thus, the proposed activities could occur during the very early- (Feb 1- Mar 1) or later- (June 16-Aug 15) portions of the bald eagle nesting season, or the non-nesting (August 16-February 1) season. Minor disturbance to bald eagles could occur for any activities that could be conducted during the nesting period in the home ranges. Conversely, no disturbance to bald eagles would be anticipated should those activities be conducted during the non-nesting period.

Minor reductions in the availability of large snags or emergent trees that could be used as nest or perch trees could occur in the home range. No changes to human access to the home ranges would occur, thereby limiting potential for introducing additional human disturbance to the territories. Thus, a negligible risk of direct and indirect effects to bald eagles would be anticipated since: 1) disturbance could be slightly elevated within the home ranges during operations, should they occur during the nesting period; 2) no appreciable change in human access within the project area would occur; and 3) minor reductions in the availability of large, emergent trees could occur in the home ranges.

Action Alternative: Cumulative Effects

Nesting bald eagles in these home ranges would continue to experience varying levels of disturbance. Any potential disturbance and/or noise from the proposed harvesting would be additive to any of these other forms of disturbance, however no changes in bald eagle behavior would be anticipated. Negligible reductions in emergent trees or snags could occur on a small portion of the home ranges. Thus, a negligible risk of cumulative effects to bald eagles would be anticipated since: 1) disturbance would be slightly elevated within the territories during harvesting operations; 2) no changes in human access within the territories would occur; and 3) negligible changes in the availability of large, emergent trees would be expected.

FISHER

Issue

Proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.

Introduction

Fishers are a mid-sized forest carnivore whose prey includes small mammals such as voles, squirrels, snowshoe hares, and porcupines, as well as birds (Powell and Zielinski 1994). They also take advantage of carrion and seasonally available fruits and berries (Foresman 2012). Fishers use a variety of successional stages but are disproportionately found in stands with dense canopies (Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994) and avoid openings or young forested stands (Buskirk and Powell 1994, Weir and Corbould 2010). However, some use of openings may occur for short hunting forays or if sufficient overhead cover (shrubs or saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (Jones 1991). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on the 44,312-acre cumulative effects analysis area described above in the Analysis Areas portion of this analysis. This scale includes enough area to approximate overlapping home ranges of male and female fishers (Heinemeyer and Jones 1994).

Existing Environment

There are approximately 2,793 acres (38%) of potential upland fisher habitats and 148 acres (2%) of potential riparian habitats in the project area. Additionally, there are 1,166 acres of upland preferred habitats and another 58 acres of preferred habitats in riparian areas that presently lack structural attributes that would facilitate use by fisher. Existing habitats are partially connected throughout the cumulative effects analysis area, but considerable timber management in the past has likely reduced overall suitability for fisher in the cumulative effects analysis area and presence of unsuitable habitat types; connectivity along riparian features throughout the cumulative effects analysis area is reasonably intact. Within the cumulative effects analysis area, there are roughly 36,281 acres that would be classified as upland (more than 100 ft from Class 1 and more than 50 feet from Class 2 streams) and 2,062 acres that would be classified as riparian that are associated with the 128 miles of streams in the cumulative effects analysis area. On DNRC-managed lands, 83% of the potential riparian fisher habitats in the cumulative effects analysis area are providing

structural habitat attributes that would facilitate use by fisher. Potential fisher habitats likely exist on a portion of the 13,426 acres (57% of non-DNRC lands) of forested stands that are below 6,000 feet in elevation across the cumulative effects analysis area, including roughly 507 acres that are in close proximity to streams in the cumulative effects analysis area. Within the cumulative effects analysis area, fisher habitats are largely absent from the 6,777 acres (29% of non-DNRC lands below 6,000 feet in elevation) of shrubs, herbaceous, and non-forested habitats and is likely fairly limited on the other 3,367 acres (14% of non-DNRC lands below 6,000 feet in elevation) of sparsely stocked and young forest habitats in the cumulative effects analysis area. Ongoing timber management in the cumulative effects analysis area could continue to alter potential fisher habitats.

Environmental Effects-Fisher

No Action Alternative: Direct and Indirect Effects

No direct and indirect effects to fishers would be anticipated since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be further altered; 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to public access or the potential for trapping mortality would be anticipated.

No Action Alternative: Cumulative Effects

No further cumulative effects to fishers would be anticipated since: 1) no further changes to existing habitats on DNRC-managed lands would occur; 2) any landscape connectivity afforded by the stands on DNRC-managed lands would not change appreciably; 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected; and 4) no changes to public access or the potential for trapping mortality would be anticipated.

Action Alternative: Direct and Indirect Effects

No riparian habitats within 100 feet of class 1 streams or 50 feet of class 2 streams would be altered with the proposed activities. Approximately 1,321 of the 2,793 acres (47%) of upland fisher habitats in the project area would receive treatments that would reduce canopy closure and would likely be too open to be used by fisher; however roughly 378 of these acres are proposed to receive a commercial thin or individual tree selection treatment, which could retain sufficient canopy closure to facilitate some limited use by fishers following proposed treatments. Proposed thinning and planting in fisher habitats would improve future fisher habitats by decreasing the time until those stands provide structural attributes needed by fisher. No changes in open roads would be anticipated; a slight increase in non-motorized access could occur with the proposed construction of 0.65 miles of restricted road. Trapping pressure and the potential for fisher mortality could remain similar to present levels. Minor reductions in landscape connectivity could occur with the proposed activities, but activities would avoid riparian areas commonly used by fisher. Thus, a minor risk of adverse direct and indirect effects to fisher would be anticipated since: 1) harvesting would avoid riparian areas, but would modify upland fisher habitats; 2) minor reductions in landscape connectivity would occur, but those areas associated with riparian areas would remain unaffected; 3) harvesting would reduce snags and snag-recruitment trees while increasing coarse woody debris levels; however, some of these resources would be retained; and 4) no changes in legal motorized human-access levels would be anticipated.

Action Alternative: Cumulative Effects

Since no riparian habitats associated with Class 1 or 2 streams would be modified, no changes in the amount of the preferred riparian fisher cover types meeting structural requirements for fishers at the cumulative-effects analysis area would occur. Reductions in upland habitats on DNRC-managed lands (1,321 acres) would further reduce the amount of suitable upland fisher habitats in the cumulative effects analysis area. These reductions would be additive to the losses associated with past timber harvesting in the cumulative-effects analysis area as well as any ongoing harvesting associated with the Chamberlain-Wales Resource Management Projects on BLM-managed lands. No appreciable changes to landscape connectivity would be anticipated, and activities would avoid riparian areas commonly used by fisher. No changes in legal, motorized public access would occur. Overall, no appreciable changes in human disturbance

and potential trapping mortality would be anticipated. Thus, a minor risk of adverse cumulative effects to fisher would be anticipated since: 1) harvesting would modify some upland fisher habitats, but upland habitats would persist; 2) no appreciable changes in landscape connectivity would be anticipated and connectivity in riparian areas would not be altered; 3) harvesting in a relatively small portion of the cumulative-effects analysis area would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces; and 4) no changes to legal, motorized public access would occur.

FLAMMULATED OWLS

Issue

Proposed activities may alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, while potentially removing snags needed by flammulated owls for nesting.

Introduction

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. In Montana, flammulated owls appear to initiate nesting later than most of the other owl species; they generally initiate nesting in May, and nestlings usually fledge during August. In general, preferred habitats have open to moderate canopy closure (30-50 percent) with at least 2 canopy layers, and are often near small clearings. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh ponderosa pine, Douglas-fir, or aspen. Without disturbance, Douglas-fir encroach upon ponderosa pine stands resulting in increased stand density and decreased habitat quality for flammulated owls. Periodic, low-intensity underburns can increase habitat suitability and sustainability by reducing the density of understory seedlings and saplings, stimulating shrub growth, and by protecting large dominant trees from ladder fuels and competition with other mature trees.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on the 20,748-acre cumulative effects analysis area described above in the Analysis Areas portion. This area includes enough area to support several pairs of flammulated owls (McCallum 1994).

Existing Environment

There are approximately 4,832 acres (65% of the project area) of potential flammulated owl habitats in dry Douglas-fir and Douglas-fir/western larch stands across the project area. There are an additional 1,656 acres of potential flammulated owl habitats on dry Douglas-fir and Douglas-fir/western larch stands on DNRC-managed lands within the cumulative effects analysis area. Some suitable habitats likely exist on a portion of the 6,136 acres (55% of non-DNRC-managed lands) of open and closed forested habitats on other ownerships in the cumulative effects analysis area; however, like the project area, portions of these forested areas are not likely preferred flammulated owl habitat types. Elsewhere in the cumulative effects analysis area, some of the forested habitats have been harvested in the recent past, potentially improving flammulated owl habitat by creating foraging areas and reversing a portion of the Douglas-fir encroachment and opening up stands of ponderosa pine; however retention of large ponderosa pine and/or Douglas-fir was not necessarily a consideration in some of these harvest units, thereby minimizing the benefits to flammulated owls. Ongoing pre-commercial thinning (698 acres within cumulative effects analysis area) associated with the West Chamberlain Project on DNRC-managed lands in the cumulative effects analysis area is opening up younger stands and improving foraging habitats while improving growth of potential future nesting trees. Similarly, roughly 275 acres of pre-commercial thinning treatments associated the Chamberlain-Wales Resource Management Project on BLM-managed lands would improve flammulated owl foraging habitats while improving radial growth of young trees that may be future nest structures. Timber management (60 acres) and prescribed burning (172 acres) on BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects would improve potential flammulated owl habitats by reducing Douglas-fir encroachment and creating foraging habitats while mitigations would retain potential nesting trees and dense patches of vegetation potentially used for roosting owls. Modern fire suppression has allowed Douglas-fir in-growth to create denser stands of ponderosa pine and Douglas-fir in portions of the cumulative effects analysis area, which has reduced habitat quality for flammulated owls.

Environmental Effects-Flammulated Owl

No Action Alternative: Direct and Indirect Effects

Existing flammulated owl habitats in the project area would persist. Thus, a negligible risk of adverse direct and indirect effects to flammulated owls would be anticipated since: 1) no disturbance to flammulated owls would be anticipated; and 2) no changes to potential nesting habitats would be anticipated.

No Action Alternative: Cumulative Effects

Existing flammulated owl habitats would persist. Thus, a negligible risk of adverse cumulative effects to flammulated owls would be anticipated since: 1) no disturbance to flammulated owls would be anticipated; and 2) no changes to potential nesting habitats would be anticipated.

Action Alternative: Direct and Indirect Effects

Flammulated owls can be tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with proposed activities could negatively affect flammulated owls should activities occur when flammulated owls are present. Proposed activities would not occur between April 1 and June 15, but could overlap the nestling and fledgling periods after June 15. Since some snags and large trees would be retained, loss of nest trees would be expected to be minimal. Proposed activities on 1,636 acres of potential flammulated owl habitats (34% of the habitats in the project area) would open the canopy while favoring western larch, ponderosa pine, and Douglas-fir. The proposed treatments would reduce canopy closure, which would allow more sunlight to reach the forest floor, which could stimulate grass and shrub growth, providing habitat for moths and other flying insects that provide food for flammulated owls. Elements of the forest structure important for nesting flammulated owls, including snags, coarse woody debris, numerous leave trees, and snag recruits would be retained in the proposed units. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of limited existing snags would move the project area toward historical conditions, which is preferred flammulated owl habitat. The proposed pre-commercial thinning of ponderosa pine and Douglas-fir types could improve flammulated owl foraging habitats, while contributing to an increased representation of ponderosa pine in the future in those stands, which would improve potential flammulated owl habitat quality. Thus, a minor risk of adverse direct and indirect effects would be expected to flammulated owls since: 1) the potential exists to disturb flammulated owls; 2) proposed thinning could lessen the duration before these affected stands are again suitable for flammulated owl use; and 3) harvesting would open denser stands up while retaining elements of forest structure used for foraging and nesting by flammulated owl, improving overall flammulated owl habitat conditions in the project area.

Action Alternative: Cumulative Effects

Disturbance in flammulated owl habitats would be possible on a small portion of the cumulative effects analysis area and could be additive to ongoing activities in the cumulative effects analysis area, including any activities associated with the West Chamberlain 2017 and Chamberlain-Wales Resource Management Projects in the vicinity. Proposed harvesting would increase the amount of the cumulative effects analysis area that has been recently harvested, which would add to the amount of foraging habitats available, but possibly at the expense of losing snags and large trees important for nesting. Overall no change in the amount of potential flammulated owl habitats would exist on DNRC-managed lands or any other ownerships; a slight improvement in habitat quality at the cumulative-effects analysis level could be realized with this alternative and the more historic conditions likely after proposed activities. Thus, a negligible risk of adverse cumulative effects to flammulated owls would be expected since: 1) harvesting could disturb flammulated owls in a small portion of the cumulative effects analysis area should activities occur during the period when flammulated owls are in the vicinity; and 2) harvesting would improve the quality and sustainability of flammulated owl habitat on a portion of the cumulative effects analysis area by making this area more representative of historic conditions.

GRAY WOLF

Issue

Proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.

Introduction

Wolves are a wide-ranging, mobile species that occupy a wide variety of habitats that possess adequate prey and minimal human disturbance, especially at den and/or rendezvous sites. Wolves are opportunistic carnivores that frequently take vulnerable prey (including young individuals, older individuals, and individuals in poor condition). In general, wolf densities are positively correlated to prey densities (Fuller et al. 1992, Oakleaf et al. 2006). In Montana,

wolves prey primarily on white-tailed deer and elk (Kunkel et al. 1999, Arjo et al. 2002). Thus, reductions in big game populations and/or winter range productivity could indirectly be detrimental to wolf populations.

Wolves typically den during late April in areas with gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas. When the pups are 8 to 10 weeks old, wolves leave the den site and start leaving their pups at rendezvous sites while hunting. These sites are used throughout the summer and into the fall. Disturbance at den or rendezvous sites could result in avoidance of these areas by the adults or force the adults to move the pups to a less adequate site. In both situations, the risk of pup mortality increases.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on the 44,312-acre area described above in the Analysis Areas portion of this analysis. This scale includes enough area to support at least 1 pack of wolves.

Existing Environment

The project area has been partially in Elevation Mountain, Chamberlain, and Ovando Mountain wolf pack annual home ranges in the past. Several landscape features commonly associated with denning and rendezvous sites occur in the project area, such as areas with gentle terrain near a water source (valley bottoms), areas that are close to big game winter ranges, and areas that are close to meadows or other openings. No known den or rendezvous sites occur in the project area, but some use of the project area by wolves could occur for breeding, hunting, or other life requirements. Big game species exist in the project area much of the non-winter period. Winter range for white-tailed deer (1,614 acres), mule deer (3,123 acres), elk (1,817 acres), and moose (7,469 acres) exists in the project area. Approximately 5,347 acres of the project area (72%) appear to be providing snow intercept and thermal cover attributes for big game. Within the cumulative-effects analysis area, big game species are fairly common and winter range for deer and elk are fairly widespread in the lower elevation areas. Roughly 19,171 acres of winter range (43%) exist in the cumulative effects analysis area; approximately 28,240 acres of forested habitats in the cumulative effects analysis area appears to have sufficient canopy closure to provide thermal cover and snow intercept for big game. Numerous landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water, close to big game winter range, and in gentle terrain, occur in the cumulative-effects analysis area. Past timber management and human developments have altered big game and wolf habitats in the cumulative effects analysis area. Ongoing modifications to stand densities on 2,041 acres of DNRC-managed lands associated with the West Chamberlain 2017 pre-commercial thinning project and 669 acres of BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects could disturb big game and/or wolves, while also potentially having negligible effects on thermal cover, snow intercept, or summer range habitat attributes in the cumulative effects analysis area. Similarly, ongoing timber management (673 acres) and prescribed fire (1,483 acres) associated with the same series of projects on BLM-managed lands in the cumulative effects analysis area could further disturb gray wolves and their big game prey, while also altering security habitats, hiding cover, and big game foraging habitats.

Environmental Effects-Gray Wolf

No Action Alternative: Direct and Indirect Effects

Negligible direct and indirect effects would be expected to gray wolves since: 1) no changes in human disturbance levels would occur; and 2) no appreciable changes to prey availability would occur.

No Action Alternative: Cumulative Effects

White-tailed deer, mule deer, and elk winter ranges would not be further affected and substantive changes in big game populations, distribution, or habitat use would be not anticipated. Levels of human disturbance would be expected to remain similar to present levels. Past harvesting and any ongoing harvesting may cause shifts in big game use and, subsequently, gray wolf use, of the cumulative-effects analysis area; however, no further changes would be anticipated that would alter levels of gray wolf use of the cumulative-effects analysis area. Thus, no further cumulative effects to gray wolves would be expected since: 1) no changes in human disturbance levels would occur, particularly near known wolf den and/or rendezvous sites; and 2) no changes to prey availability would occur.

Action Alternative: Direct and Indirect Effects

Wolves using the area could be disturbed by harvesting activities and are most sensitive at den and rendezvous sites, which are not known to occur in the project area or within 1 mile of the project area. If a den or rendezvous site were identified within 1 mile of the project area, a DNRC biologist would be consulted to determine if additional mitigations would be necessary. Seasonal operations constraints would restrict activities between April 1 and June 15. These seasonal constraints would limit potential disturbance at any potential den sites and rendezvous sites in the vicinity. No changes in legal, motorized public access would occur. After proposed activities, human disturbance levels would likely revert to pre-harvest levels. Wolf use of the project area for denning and rendezvous sites would likely revert to pre-harvest levels following proposed activities. In the short-term, the proposed harvesting could lead to slight shifts in big game use, which could lead to a shift in wolf use of the project area. Proposed harvesting activities on approximately 1,510 acres (20% of the project area) would alter canopy closure, summer big game habitat, and big game winter range habitat; proposed pre-commercial thinning on up to 1,400 acres (19% of the project area) would alter canopy closure and summer habitat. The modifications to summer range could alter some big game use of the project area, and subsequently could alter the use of the project area by wolves. Proposed activities would occur on roughly 470 acres (29%) of white-tailed deer winter range, 1,394 acres (45%) of mule deer winter range, 479 acres (26%) of elk winter range, and 2,422 acres of moose winter range (32%); proposed activities would reduce canopy closure and potential winter use by big game on roughly 1,844 acres (34%) that likely have attributes facilitating considerable winter use by big game. Collectively, reductions in big game winter range habitats could redistribute big game, but would not be expected to appreciably alter wolf prey abundance. Thus, a low risk of direct and indirect effects would be expected to gray wolves since: 1) minor increases in human disturbance levels would occur, with no increases near known wolf den and/or rendezvous sites anticipated; and 2) changes to big game summer habitats and winter range could alter big game use of the project area, but would not appreciably alter prey availability.

Action Alternative: Cumulative Effects

Disturbance to gray wolves in a portion of the cumulative effects analysis area would be possible, but would only occur for the short-period of time that activities would be occurring. No changes in legal, motorized human access would be anticipated. Reductions in big game winter range would occur in a small portion of the cumulative effects analysis area; winter big game survival would not be expected to change appreciably. Reductions in cover in a small portion of the cumulative effects analysis area may cause slight changes in use by deer, elk, and moose; however, no appreciable changes in use within the cumulative-effects analysis area would be expected. These reductions in cover would be additive to losses from past timber-harvesting activities as well as any ongoing harvesting in the cumulative-effects analysis area, including any activities associated with the West Chamberlain and Chamberlain-Wales Resource Management projects in the vicinity. No substantive change in wolf use of the cumulative-effects analysis area would be expected; wolves could continue to use the area in the long-term. Thus, a low risk of cumulative effects to gray wolves would be expected since: 1) elevated human disturbance levels would be short-lived and negligible changes to long-term disturbance levels would be anticipated with no increases near known wolf den and/or rendezvous sites; and 2) modifications to big game summer range and winter range could alter big game distributions, but no appreciable changes to wolf prey availability would be anticipated.

PILEATED WOODPECKERS

Issue

Proposed activities could reduce suitable nesting and foraging habitat for pileated woodpeckers, which could alter pileated woodpecker use of the area.

Introduction

The pileated woodpecker is one of the largest woodpeckers in North America and excavates the largest cavities of any woodpecker. Preferred nest trees are large diameter western larch, ponderosa pine, cottonwood, and quaking aspen

trees and snags, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. Aney and McClelland (1985) described pileated nesting habitat as "...stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and downed wood for feeding, closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in stands (McClelland 1979).

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area (7,469 acres). Cumulative effects were analyzed on the 20,748-acre cumulative effects analysis area described above in the Analysis Areas portion of this analysis. This scale includes enough area to support several pairs of pileated woodpeckers (Bull and Jackson 1995).

Existing Environment

Pileated woodpeckers have been documented near the project area in the past. In the project area, potential pileated woodpecker nesting habitat exists on approximately 1,543 acres (21% of the project area). These habitats are dominated by Douglas-fir and Douglas-fir/western larch stands. Additionally, 3,863 acres (52% of the project area) of sawtimber stands, dominated by Douglas-fir and Douglas-fir/western larch exist in the project area, which may be potentially suitable foraging habitats. In the cumulative effects analysis area, roughly 2,110 acres (22%) of pileated woodpecker habitats exist on DNRC-managed lands dominated by Douglas-fir and Douglas-fir/western larch. An additional 5,469 acres (57%) of potential feeding habitats exist on DNRC managed lands within the cumulative effects analysis area. Some suitable habitats likely exist on a portion of the 4,655 acres of forested habitats on other ownerships in the cumulative effects analysis area (42% of non-DNRC lands). Much of the 6,423 acres (58%) of shrubs, herbaceous areas, poorly stocked forested stands, burned habitats, and recently harvested stands on other ownerships in the cumulative effects analysis area is likely to open to be useful to pileated woodpeckers. Ongoing pre-commercial thinning (698 acres within cumulative effects analysis area) associated with the West Chamberlain 2017 Project on DNRC-managed lands in the cumulative effects analysis area is opening up younger stands and improving radial tree growth and future pileated woodpecker habitat. Similarly, roughly 275 acres of pre-commercial thinning treatments associated the Chamberlain-Wales Resource Management Project on BLM-managed lands would improve tree growth which could facilitate use by pileated woodpeckers sooner than if left un-thinned. Timber management (60 acres) and prescribed burning (172 acres) on BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects would reduce potential pileated woodpecker habitats, but mitigations to retain large snags, trees, and coarse woody debris would be implemented. Across the cumulative effects analysis area, ongoing tree mortality is reducing forested cover while increasing the amount of dead wood resources available for pileated woodpeckers.

Environmental Effects-Pileated Woodpecker

No Action Alternative: Direct and Indirect Effects

A negligible risk of adverse direct and indirect effects to pileated woodpeckers would be expected since: 1) no harvesting would occur; 2) no further changes in the amount of continuously forested habitats would be anticipated; 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated; and 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would be anticipated.

No Action Alternative: Cumulative Effects

No disturbance of pileated woodpeckers would occur. Continued use of the cumulative-effects analysis area by pileated woodpeckers would be expected at similar levels as presently occurring. Thus, a negligible risk of adverse cumulative effects to pileated woodpeckers would be expected since: 1) no further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and 3) long-term, succession-related changes in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

Action Alternative: Direct and Indirect Effects

Pileated woodpeckers can to be tolerant of human activities (Bull and Jackson 1995) but might be temporarily displaced by any proposed activities that could occur during the nesting period. Proposed activities would not occur between April 1 and June 15, which would prevent potential disturbance during the early nesting season, but activities could disturb pileated woodpeckers should they occur during the later parts of the nesting season. Harvesting would reduce forested habitats for pileated woodpeckers in the project area. Roughly 407 acres (26%) of the potential nesting habitat along with 818 acres (21%) of potential foraging habitats would be harvested. Some of the stands proposed for commercial thinning and/or individual tree selection treatments could be dense enough to receive some use by foraging pileated woodpeckers following proposed treatments, but most of these stands would be temporarily unsuitable for pileated woodpeckers due to the openness of the stands following proposed treatments. Quality of these potential pileated woodpecker habitats would be reduced for 20-40 years, depending on the density of trees retained. Elements of the forest structure important for nesting pileated woodpeckers, including snags, coarse woody debris, numerous leave trees, and snag recruits would be retained in the proposed harvest areas. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979), pileated woodpecker densities in the project area would be expected to be reduced on 1,254 acres. The silvicultural prescriptions would retain healthy western larch, ponderosa pine, and Douglas-fir while promoting the growth and/or regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. The proposed pre-commercial thinning and any planting could improve potential pileated woodpecker habitat quality into the future. Thus, a minor risk of adverse direct and indirect effects to pileated woodpeckers would be anticipated since: 1) harvesting would reduce the amount of continuous-forested habitats available; 2) potential nesting habitats and foraging habitats would be removed; 3) snags and snag recruits would be removed; however, mitigation measures to retain some snags and snag recruits would be included, and 4) proposed treatments would promote seral species in the project area.

Action Alternative: Cumulative Effects

Reductions in pileated woodpecker habitat quality and the amount of continuously forested habitats available for pileated woodpeckers would occur. On DNRC-managed lands in the cumulative effects analysis area, roughly 1,703 acres (81%) of pileated woodpecker nesting and 4,651 acres (85%) of foraging habitats would not be altered. Another 551 acres of potential foraging habitats would be thinned, but proposed activities should not appreciably alter existing foraging attributes for pileated woodpeckers. Any ongoing harvesting in the cumulative effects analysis area, including any harvesting associated with the Chamberlain-Wales Resource Management Projects, could continue altering potential pileated woodpecker habitats in the vicinity. Snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes may be reduced in a portion of the area by the proposed activities. Modifications to pileated woodpecker habitats under this alternative would be additive to habitat losses associated with past harvesting; continued use of the cumulative effects analysis area would be anticipated, but likely at a slightly reduced level. Continued maturation of stands across the cumulative-effects analysis area would provide future pileated woodpecker habitats. Thus, a minor risk of adverse cumulative effects to pileated woodpeckers would be anticipated since: 1) harvesting would further alter the amount of continuous forested habitats available in the cumulative-effects analysis area; 2) potential nesting and foraging habitats would be modified, but some habitats would persist in the cumulative-effects analysis area; 3) snags and snag recruits would be removed; however, mitigation measures would retain some of these attributes; and 4) proposed treatments would promote seral species in a portion of the cumulative effects analysis area.

BIG GAME

BIG GAME WINTER RANGE

Issue

Proposed activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range

Introduction

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support large numbers of big game, which are widely distributed during the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow. The effect is that temperatures are moderated and snow depths are lowered, which enables big game movement and access to forage with less energy expenditure than in areas with deeper snow and colder temperatures. Snow depths differentially affect big game; white-tailed deer are most affected, followed by mule deer, elk, and then moose. Thus, removing cover that is important for wintering big game through forest management activities can increase their energy expenditures and stress in winter, but may increase forage production for use on summer range. Reductions in cover could ultimately result in a reduction in winter range carrying capacity and subsequent increases in winter mortality within local big game herds.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the 7,469-acre project area. Cumulative effects were analyzed on the combined winter ranges in the 44,312-acre cumulative effects analysis area described above in the Analysis Areas portion of this analysis. This scale includes enough area to support hundreds of elk.

Existing Environment

Montana Department of Fish, Wildlife, and Parks identified white-tailed deer mule deer (1,614 acres), mule deer (3,123 acres), elk (1,817 acres), and moose (7,469 acres) winter range in the project area. These winter ranges are part of larger winter ranges in the area. Mature Douglas-fir, with lesser amounts of mixed conifer stands, in the project area are providing attributes facilitating use by wintering big game. Approximately 5,347 acres of the project area (72%) appear to be providing snow intercept and thermal cover attributes for big game. Evidence of non-winter use by deer, elk, and moose was noted during field visits.

Roughly 19,171 acres of composite deer and elk winter range (43% of the cumulative effects analysis area) exist in the cumulative effects analysis area; roughly 28,240 acres (64%) of the cumulative effects analysis area appears to have sufficient canopy closure to provide thermal cover and snow intercept for big game. In the recent past, timber harvesting within the cumulative effects analysis area has reduced thermal cover and snow intercept. Portions of the cumulative effects analysis area are in non-forested, herbaceous, or shrub types, which would not be expected to provide thermal cover or snow intercept in the future. Human disturbance within the winter range is associated with residential development, agricultural activities, recreational snowmobile use, commercial timber management, and several roads. Ongoing modifications to stand densities on 2,041 acres of DNRC-managed lands associated with the West Chamberlain 2017 pre-commercial thinning project and 669 acres of BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects could disturb big game, while also likely having negligible effects on thermal cover and snow intercept in the cumulative effects analysis area. Similarly, ongoing timber management (673 acres) and prescribed fire (1,483 acres) associated with the Chamberlain-Wales Projects in the cumulative effects analysis area could further disturb big game, while also altering thermal cover, snow-intercept, and big game foraging habitats.

Environmental Effects-Big Game Winter Range

No Action Alternative: Direct and Indirect Effects

No direct or indirect effects to big game winter range would be anticipated since: 1) no further changes in the amount of mature-forested habitats in the winter range would be anticipated; 2) no further changes in thermal cover and snow intercept would be anticipated; and 3) human disturbance levels would not change.

No Action Alternative: Cumulative Effects

Continued winter use of the larger winter range would be expected. No further changes in thermal cover and snow intercept would be anticipated. Human disturbance levels would be anticipated to continue at current levels. No appreciable changes to big game distribution or habitat use would be anticipated. Thus, no cumulative effects to big game winter range would be expected since: 1) no further changes in the amount of mature-forested habitats in the winter range would be anticipated; 2) no further changes in thermal cover and snow intercept would occur; and 3) human disturbance levels would not change

Action Alternative: Direct and Indirect Effects

Proposed activities could occur in the winter, and disturbance created by mechanized logging equipment and trucks could temporarily displace big game animals during periods of operation for 3 to 5 years. However, winter logging provides felled tree tops, limbs, and slash piles that could concentrate feeding deer during nighttime and quiet periods when logging operations are shut down. Increasing short-term forage availability in this manner may partially offset some of the effects associated with temporary displacement caused by logging disturbance. There would be short-term added risk of disturbance and displacement of wintering animals that could result in moderate adverse effects associated with logging operations, short term road construction, and road use in the project area. However, no long-term effect to winter range carrying capacity or factors that would create long-term displacement or reduced numbers of big game would be anticipated.

Proposed activities would occur on roughly 470 acres (29%) of white-tailed deer winter range, 1,394 acres (45%) of mule deer winter range, 479 acres (26%) of elk winter range, and 2,422 acres of moose winter range (32%); proposed activities would reduce canopy closure and potential winter use by big game on roughly 1,844 acres (32%) that likely have attributes facilitating considerable winter use by big game. Following proposed activities, canopy densities in these stands providing snow intercept and thermal cover would be reduced, reducing habitat quality for wintering big game. In general, it could take 30 to 50 years for these stands to regenerate and attain a size capable of providing thermal cover for big game. Proposed activities would not prevent big game movement through the project area appreciably in winter and could stimulate browse production in the units. Proposed pre-commercial thinning and any planting would not appreciably alter winter range attributes but could shorten the time before some of these stands provide these attributes to big game in the future. Thus, a minor risk of adverse direct or indirect effects to big game winter range would be anticipated since: 1) the relatively short-term that logging activities could create disturbance in this area; 2) harvesting would alter a relatively small amount of the stands that are providing thermal cover and snow intercept habitats for big game species; and 3) portions of winter ranges for several species of big game would be altered.

Action Alternative: Cumulative Effects

Disturbance and displacement associated with this alternative could be additive to any displacement associated with ongoing activities in the cumulative effects analysis area and any other disturbances that may be affecting wintering big game. Similarly, any harvesting that may be occurring in the cumulative effects analysis area could continue altering big game winter range and/or disturbing big game. Proposed activities would reduce canopy closure on 1,394 acres of winter range (16%) and roughly 1,844 acres (32%) of forested stands that appear to have attributes facilitating considerable use by wintering big game. Modifications to thermal cover and snow intercept in the project area could further alter the amount of the larger winter range providing these attributes for big game. Continued use of the larger winter range would be expected. Thus, a minor risk of adverse cumulative effects to big game would be anticipated since: 1) the relatively short-term that logging activities would create disturbance in a small portion of the cumulative effects analysis area; 2) a small percentage of the larger winter range would be altered; 3) availability of lower-quality cover in the vicinity that provides some opportunity for big game should they be displaced.

BIG GAME SECURITY HABITAT

Issue

Proposed activities could remove big game security cover, which could affect hunter opportunity and local quality of recreational hunting.

Introduction

Timber harvesting can increase vulnerability of big game animals by changing the size, structure, juxtaposition, and accessibility of areas that provide security during hunting season (Hillis et al. 1991). As visibility and accessibility increase

within forested landscapes, moose, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters, or they may become displaced or reduced in numbers due to lowered effective carrying capacity of the local habitat. Reduced cover attributable to logging and roads can also influence the effective use of habitat for big game species. Big game security habitat are nonlinear blocks of hiding cover that are more than 0.5 mile from open roads and are a minimum of 250 acres in size. For the purpose of this analysis, cover was considered generically as big game cover for deer, elk, and moose. Because elk are highly social, wide-ranging species, providing for their cover needs helps ensure that habitat needs for other ungulates, such as deer and moose are met as well. Because of their smaller size and behavioral differences, mule deer and white-tailed deer can use smaller cover patches more effectively for escape and security. Moose are a solitary, wide-ranging species capable of effectively using relatively small cover patches, and the hunting season for moose is heavily regulated, greatly reducing risk of overharvest by humans. Therefore, for this analysis it is assumed that if available security cover would provide for the needs of elk, it would also generally be adequate to meet the needs of moose, mule deer, and white-tailed deer.

Analysis Area

Direct and indirect effects were considered at the scale of the project area (7,469 acres). Cumulative effects were analyzed on the 44,312-acre area described above in the Analysis Areas portion of this analysis. This scale includes enough area to support hundreds of elk.

Existing Environment

Hiding cover is abundant in the project area. There are limited (5.8 miles) open roads in the project area. Extensive non-motorized access to the project area exists given the presence of the open roads, the level of access to higher terrain, and the 65.9 miles of restricted roads in the project area. A portion of the project area does not contain big game security habitats due to the proximity to open roads, however roughly 1,869 acres (25% of project area) are distant enough and contain sufficient cover to be able to contribute to larger blocks of potential security habitat that extend beyond the project area.

Hiding cover varies within the cumulative effects analysis area with the recent modifications from timber management and other human activities, but the combination of topography, distance from open roads, and the presence of vegetation likely provides adequate cover for elk during the hunting season in the cumulative effects analysis area. In the cumulative effects analysis area, access for recreational hunting is relatively high, with several open roads (at least 45 miles, 0.65 miles/sq. mile) that facilitate access and numerous restricted roads (at least 260 miles; 3.8 miles/sq. mile) that could be used for non-motorized use. Within the cumulative effects analysis area, 5 patches (total of 28,636 acres; 65%) of potential security habitat exist. The largest patch extends beyond the cumulative effects analysis area and contributes to a larger block of potential security habitats. Ongoing modifications to stand densities on 2,041 acres of DNRC-managed lands associated with the West Chamberlain 2017 pre-commercial thinning project and 669 acres of BLM-managed lands associated with the Chamberlain-Wales Resource Management Projects would have negligible effects on hiding cover and security habitats. Similarly, ongoing timber management (673 acres) and prescribed fire (1,483 acres) associated with the Chamberlain-Wales Projects in the cumulative effects analysis area could further alter big game hiding cover and security habitat.

Environmental Effects-Big Game Security Habitat

No Action Alternative: Direct and Indirect Effects

No forest management activities would occur in the project area. No risk of adverse direct or indirect effects to security habitat for moose, elk, mule deer, and white-tailed deer would be expected since: 1) no changes in existing security habitat would be anticipated and continued maturation of forest cover would improve big game security habitat; 2) the level of public access to the project area would not change; and 3) no appreciable changes to big game survival would be anticipated.

No Action Alternative: Cumulative Effects

No further changes in big game security habitat would be anticipated. Past harvesting has altered big game security habitat and allowed increased human access and any ongoing alterations in the cumulative effects analysis area could continue to alter big game security habitats. Continued maturation in previously harvested stands in the cumulative-effects analysis area would improve hiding cover in those areas. No other changes in disturbance to big game and potential mortality due to hunting would be anticipated. Thus, no adverse cumulative effects to big game security habitat would be anticipated since: 1) no further reductions in big game security habitat would occur and moderate

levels of security habitat and hiding cover would persist within the cumulative-effects analysis area; 2) no changes in open roads, motorized access, or public access would occur; and 3) no appreciable changes to big game survival would be anticipated.

Action Alternative: Direct and Indirect Effects

Tree density within proposed units would be reduced on approximately 1,631 acres, including roughly 1,520 acres (62% of existing security cover) of forested stands in the project area contributing to big game security habitat. Hiding cover would be reduced within the proposed units but would improve as trees and shrubs become reestablished in the openings over the next 10-20 years. The retention of structure within proposed units and unharvested areas between the various units, including riparian habitats would reduce the potential effects of the hiding cover reductions. Some increases in sight distance would be anticipated. Proposed thinning would also increase sight distances while altering hiding cover. Overall, changes to sight distance and hiding cover would have minor effects to big game vulnerability risk in the project area. No changes in open roads or motorized access for the general public would occur. During all phases of the project, any roads opened with project activities would be restricted to the public and closed after the completion of project activities. Slight increases in non-motorized access would occur with the proposed construction of approximately 0.65 miles of restricted roads. Numerous contract stipulations would minimize the effect on the existing big game security habitat by prohibiting contractors from carrying firearms while conducting contract operations and prohibiting contractors from accessing restricted areas for other purposes, such as hunting. Collectively, a minor risk of adverse direct and indirect effects to big game security habitat would be anticipated since: 1) reductions to existing hiding cover would reduce the quality of the big game security habitat in the project area; 2) no changes in open roads, motorized access, or non-motorized access for the general public would be anticipated that could alter hunter access; and 3) negligible changes in big game survival would be anticipated.

Action Alternative: Cumulative Effects

Alterations of cover could reduce the quality of big game security habitat in a small portion of the cumulative effects analysis area and would be additive to past reductions in the cumulative effects analysis area. Ongoing activities in the cumulative effects analysis area would continue altering hiding cover, but would not be expected to appreciably alter security habitats. Continued maturation across the cumulative-effects analysis area would improve hiding cover and big game security habitat. No changes in public, motorized access or non-motorized access would be expected, which would not affect big game vulnerability in the cumulative effects analysis area. Negligible effects to big game survival would be anticipated. Thus, a minor risk of adverse cumulative effects to big game security habitat would be anticipated since: 1) quality of hiding cover in a small portion of the cumulative effects analysis area would be reduced, which would reduce the quality of the big game security habitat, but security habitat and hiding cover would persist in the cumulative-effects analysis area; 2) no changes in open roads, motorized access , or non-motorized access for the general public would be expected that would alter hunter access; and 3) negligible changes in big game survival would be anticipated.

Wildlife Mitigations

- A DNRC biologist will be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435) are needed.
- Minimize potential for disturbance to grizzly bears and numerous avian species by restricting activities between April 1 and June 15.
- Motorized public access will be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.). These roads and skid trails would be reclosed to reduce the potential for unauthorized motor vehicle use.
- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where

they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.

- Contractors and purchasers conducting contract operations will be prohibited from carrying firearms while on duty.
- Food, garbage, and other attractants will be stored in a bear-resistant manner.
- Provide visual screening for grizzly bears by designing new seed tree units such that no point in the unit is more than 600 feet from vegetation or topographic break.
- Evaluate all pre-commercial thinning units to ensure that adequate grizzly bear hiding cover persists following treatments to meet the 600 feet to cover prior to initiating any pre-commercial thinning.
- Provide visual screening for grizzly bears by retaining at least 100 feet of vegetation between all open roads and harvest units.
- Retention of patches of advanced regeneration of shade-tolerant trees, such as sub-alpine-fir and spruce, in units containing lynx habitats would break-up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx.
- In pre-commercial thinning units, retain small shade tolerant trees (such as sub-alpine fire and spruce to provide potential habitat structure for snowshoe hares by increasing the levels of horizontal cover and accelerating the development of multi-storied stands.
- Provide connectivity for fisher, Canada lynx, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridge tops, and saddles.

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Attachment H-Road Inventory Summary

Chamberlain Road Inventory Summary (2010 to 2019)

Analysis Prepared By:
Name: Andrea Stanley
Title: Hydrologist/Soils Scientist, Montana DNRC

Introduction

The Chamberlain Conservation Easement (CE; FWP, 2010) has several requirements related to road density, location, use, and inventory. These requirements include competing an inventory of roads within first five years of the CE (i.e., 2015) and subsequently every 10 years.

The CE also lists the commitment to maintain or reduce open and total road density and road density within the Riparian Management Zone (RMZ) within the area. Below is a summary of the definitions in the CE for terms relevant to this commitment.

- **Road density** calculated as miles of road by road class (Open, Restricted, and Total). The definitions of these classes are summarized below:
    - Open roads – Administratively open to the public for wheeled motorized use during any portion of the year.
    - Restricted roads – Managed to limit the manner in which motorized vehicles may be used. Restricted roads will have a physical barrier (e.g., gate, barricade, earthen berm, vegetation) that restricts general use of motorized vehicles (except for over-the snow vehicles).
    - Total roads – Combined open and restricted road classes.
- **Roads in RMZ** reported as linear miles of road located within the RMZ.
    - The RMZ width varies by stream class and presence of a channel migration zone (CMZ) on Class 1 streams, and are summarized in the table below:

Stream Class	RMZ width
Class 1 stream with CMZ	CMZ + 120 feet from each side of CMZ
Class 1 stream without CMZ	120 feet from each side of stream
Class 2 stream	50 feet
Class 3 stream	50 feet

- **Abandoned Road** – Impassible to motorized vehicles due to effective closure but has drainage features that have not been removed.
- **Reclaimed Road** – Impassible to motorized vehicles due to effective closure. It has been stabilized and culverts and other drainage structures if present have been removed, but the road prism may remain. Reclaimed roads will be re-vegetated (including soil preparation where necessary) with native vegetation consistent with the site, and made impassible to motorized vehicles through means such as ripping of road prisms, placement of root wads, boulders, slash/debris, and reforestation, etc.
- **Temporary Road** – A low-standard road that is used for forest management which, following use, will be reclaimed.

In 2010, the CE Deed listed 18 miles of open road accompanied with a map of open and restricted roads that is duplicated here in Figure H1. The miles calculated from the duplicated map and using a road shapefile from the baseline study (ESG & FWP, 2009) referenced in the CE are listed in the top row of Table H1 below.

In 2015, per the CE commitment, roads were inventoried in the Chamberlain area and the results of this inventory is shown in Figure H2. Between 2010 and 2015 some open roads were reclassed to restricted or reclaimed, resulting in a decrease open road and RMZ road miles. However, the miles of restricted roads increased by approximately 4 miles and can be attributed to a more thorough road inventory in 2015, when compared to 2010.

Ongoing monitoring and road assessments associated with timber sale and vegetation management planning through to the time of this report (2019) indicate that overall the open, restricted, total, and RMZ road densities have been maintained or are decreasing.

Table H-1: Road densities in the Chamberlain Conservation Easement 2010 to 2019.

Date / Data Source	Open Road Miles	Restricted Road Miles	Total Road Miles	RMZ Road Miles[1]
2010 Conservation Easement Roads (ESG & FWP, 2009; FWP 2010)	18.4	117.6	136.0	20.2
Post-2015 Road Inventory (DNRC, Feb 2016)	14.5	121.8	136.2	16.6
Ongoing monitoring through June 2019 (DNRC, June 2016)	13.9	121.4	135.3	16.5
Difference from 2015 to 2019	-0.6	-0.4	-0.9	-0.1

[1] Not all RMZs have been delineated in the Chamberlain CE; and similarly, not all stream classes verified. Therefore, for the purposes of this calculation, the most recent NHD stream data supplemented with streams that have been field-verified was used to estimate RMZs. All Class 1 streams are assumed to have a CMZ that is 200 feet wide. Therefore, with the addition of 120 feet beyond each edge of the CMZ, the RMZ widths for all mapped Class 1 in the CE is 440 feet wide. For all mapped Class 2 and 3 the width of the RMZ is 100 feet. Based on recent field-verification of a sample of NHD streams in the area, we believe this will yield a representative and likely higher estimate, of true RMZ area and road miles within the RMZ than the actual condition.

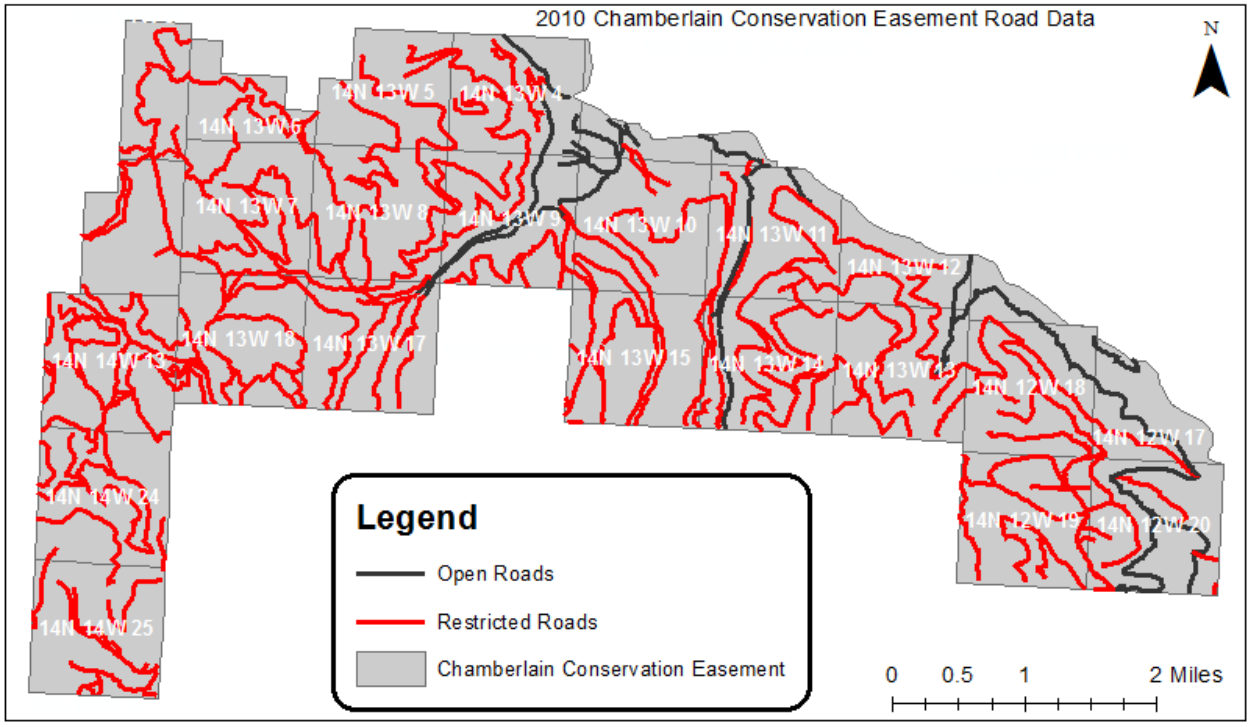

Figure H-1: Open and restricted roads in the Chamberlain Conservation Easement in 2010 (ESG & FWP, 2009; FWP 2010).

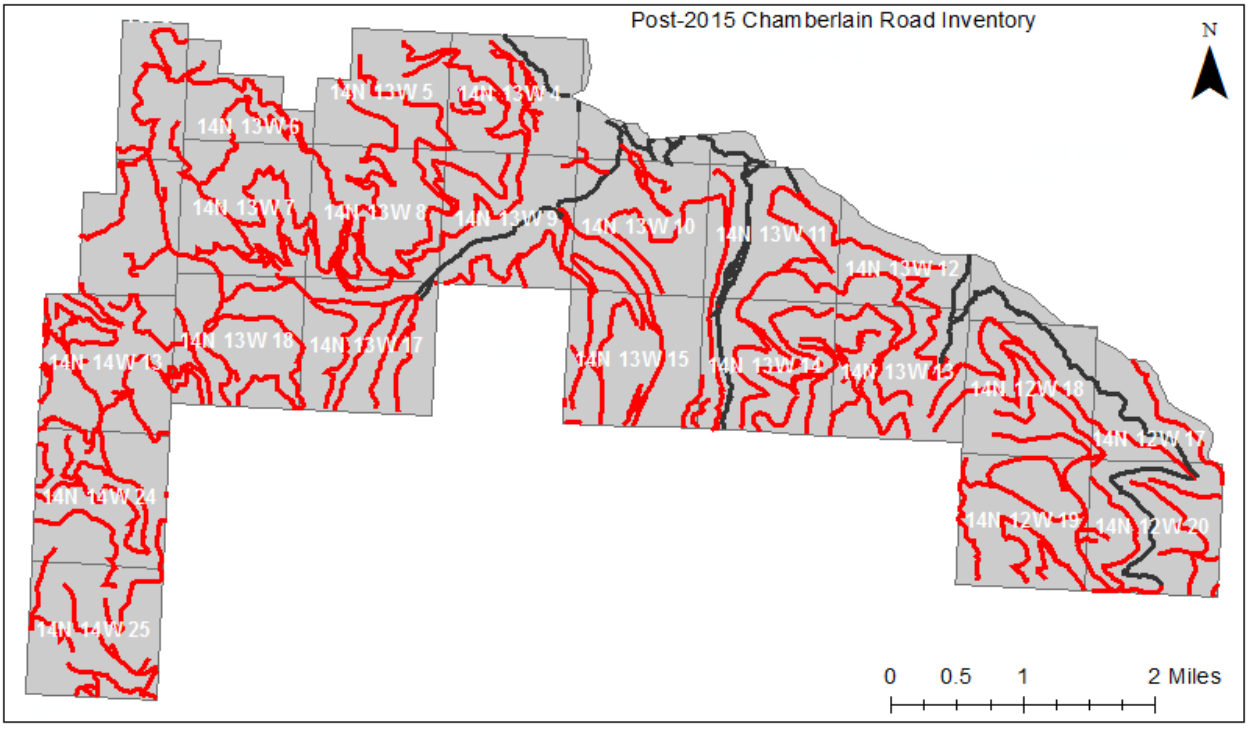

Figure H-2: Open and restricted roads in the Chamberlain Conservation Easement in 2015 (DNRC, Feb 2016).

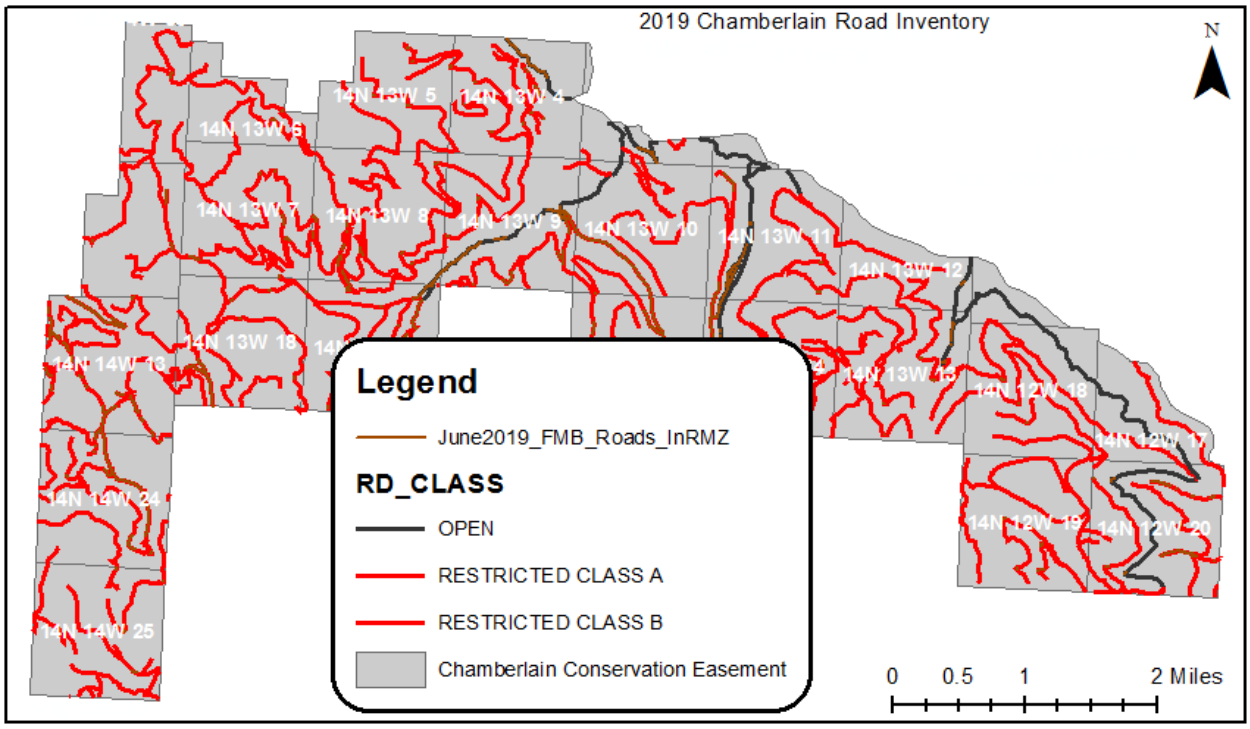

Figure H-2: Open and restricted roads in the Chamberlain Conservation Easement in 2019 (DNRC, June 2019).

References

Ecological Solutions Group LLC (ESG) and Montana Fish Wildlife and Parks (FWP), 2009, Chamberlain Creek Conservation Easement Baseline Inventory. 71p.

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